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(12) **United States Patent**
Funabashi et al.

(10) **Patent No.: US 9,242,448 B2**
(45) **Date of Patent: Jan. 26, 2016**

(54) **PRINTING PRESS AND PRINTING METHOD OF LENTICULAR LENS SHEET**

(71) Applicants: **Isao Funabashi**, Ibaraki (JP); **Koji Okasaka**, Ibaraki (JP)

(72) Inventors: **Isao Funabashi**, Ibaraki (JP); **Koji Okasaka**, Ibaraki (JP)

(73) Assignee: **KOMORI CORPORATION**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/065,325**

(22) Filed: **Oct. 28, 2013**

(65) **Prior Publication Data**

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(30) **Foreign Application Priority Data**

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Oct. 29, 2012 (JP) 2012/237986

(51) **Int. Cl.**

B41F 13/12	(2006.01)
B41F 33/00	(2006.01)
B41F 33/02	(2006.01)
B41F 21/00	(2006.01)
B41F 21/05	(2006.01)
B41F 21/06	(2006.01)
B41F 21/12	(2006.01)
B41M 3/00	(2006.01)
H04N 13/04	(2006.01)
B41M 3/06	(2006.01)
G02B 27/22	(2006.01)
G02B 3/00	(2006.01)

(52) **U.S. Cl.**

CPC ***B41F 13/12*** (2013.01); ***B41F 21/00*** (2013.01); ***B41F 21/05*** (2013.01); ***B41F 21/06*** (2013.01); ***B41F 21/12*** (2013.01); ***B41F 33/00*** (2013.01); ***B41F 33/0027*** (2013.01); ***B41F 33/02*** (2013.01); ***B41M 3/003*** (2013.01); *B41M 3/06* (2013.01); *B41P 2213/91* (2013.01); *B41P 2233/13* (2013.01); *G02B 3/005* (2013.01); *G02B 27/2214* (2013.01); *H04N 13/0404* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,462,226	A	*	8/1969	Huffaker	101/211
5,424,553	A	*	6/1995	Morton	250/548
5,457,515	A	*	10/1995	Quadracci et al.	101/483
5,689,340	A	*	11/1997	Young	356/401
5,812,152	A	*	9/1998	Torigoe et al.	347/2
5,967,032	A	*	10/1999	Bravenec et al.	101/211
6,087,054	A	*	7/2000	Cobb et al.	430/30

(Continued)

FOREIGN PATENT DOCUMENTS

JP 2007-152818 A 6/2007

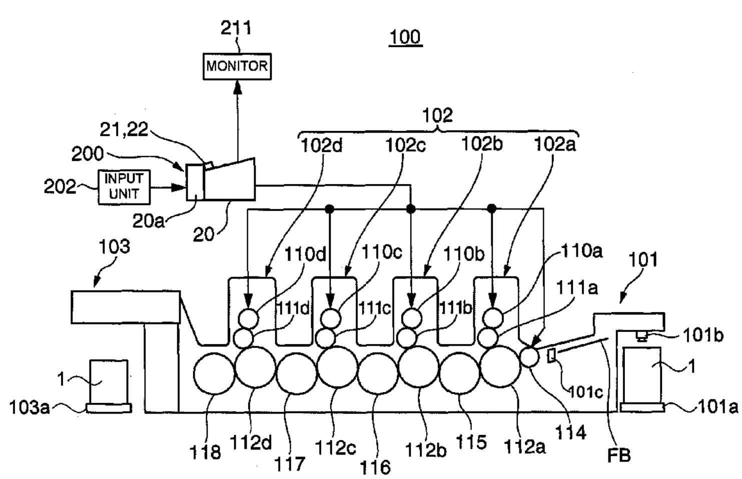
Primary Examiner — Jill Culler

(74) *Attorney, Agent, or Firm* — Blakely Sokoloff Taylor & Zafman

(57) **ABSTRACT**

In a printing press of a lenticular lens sheet, a cocking adjustment unit adjusts the relative angle between a plate on which a pattern formed from a plurality of pattern portions is formed such that boundary lines between the adjacent pattern portions become parallel and a transparent lenticular lens sheet on which a plurality of lenses are formed such that groove lines between the adjacent lenses become parallel. An adjustment amount calculation unit calculates an adjustment amount for the cocking adjustment unit based on the relationship between the boundary lines and the groove lines in a state in which the lenticular lens sheet is overlaid on the plate. A printing method of a lenticular lens sheet is also disclosed.

18 Claims, 33 Drawing Sheets



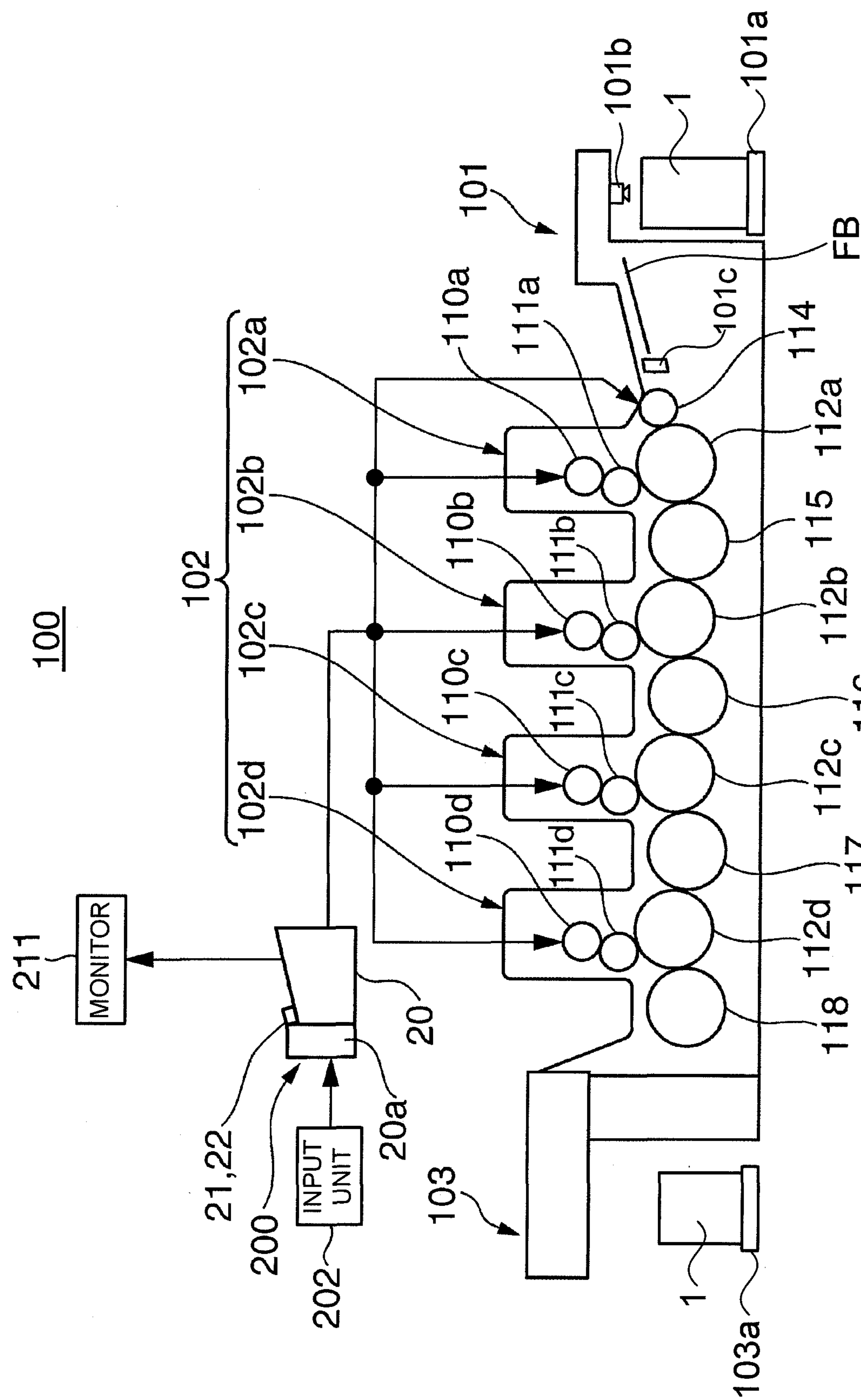
(56) **References Cited**

U.S. PATENT DOCUMENTS

6,249,384	B1 *	6/2001	Cobb et al.	359/623
6,481,844	B1 *	11/2002	Beery	347/105
RE38,065	E *	4/2003	Bravenec et al.	101/211
7,593,132	B2 *	9/2009	Bast et al.	358/1.9
8,217,972	B2 *	7/2012	Yoshida	347/198

* cited by examiner

Fig. 1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MONITOR
211
INPUT UNIT
202
200
21,22
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20a
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101a
101b
101c
FB
1
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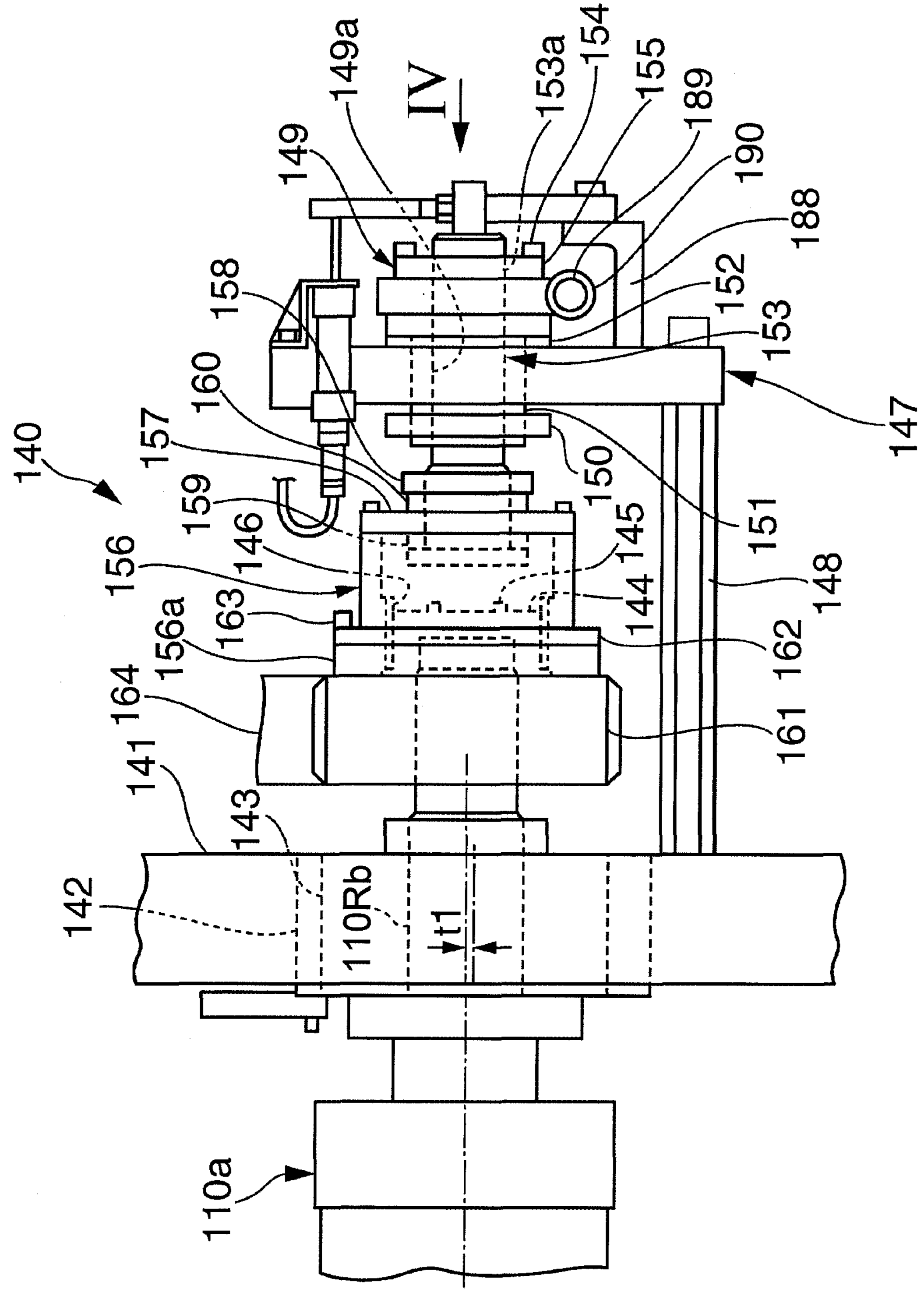
102b
102c
102d
110a
110b
110c
110d
111a
111b
111c
111d
112a
112b
112c
112d
114
115
116
117
118
103
103a

Fig. 2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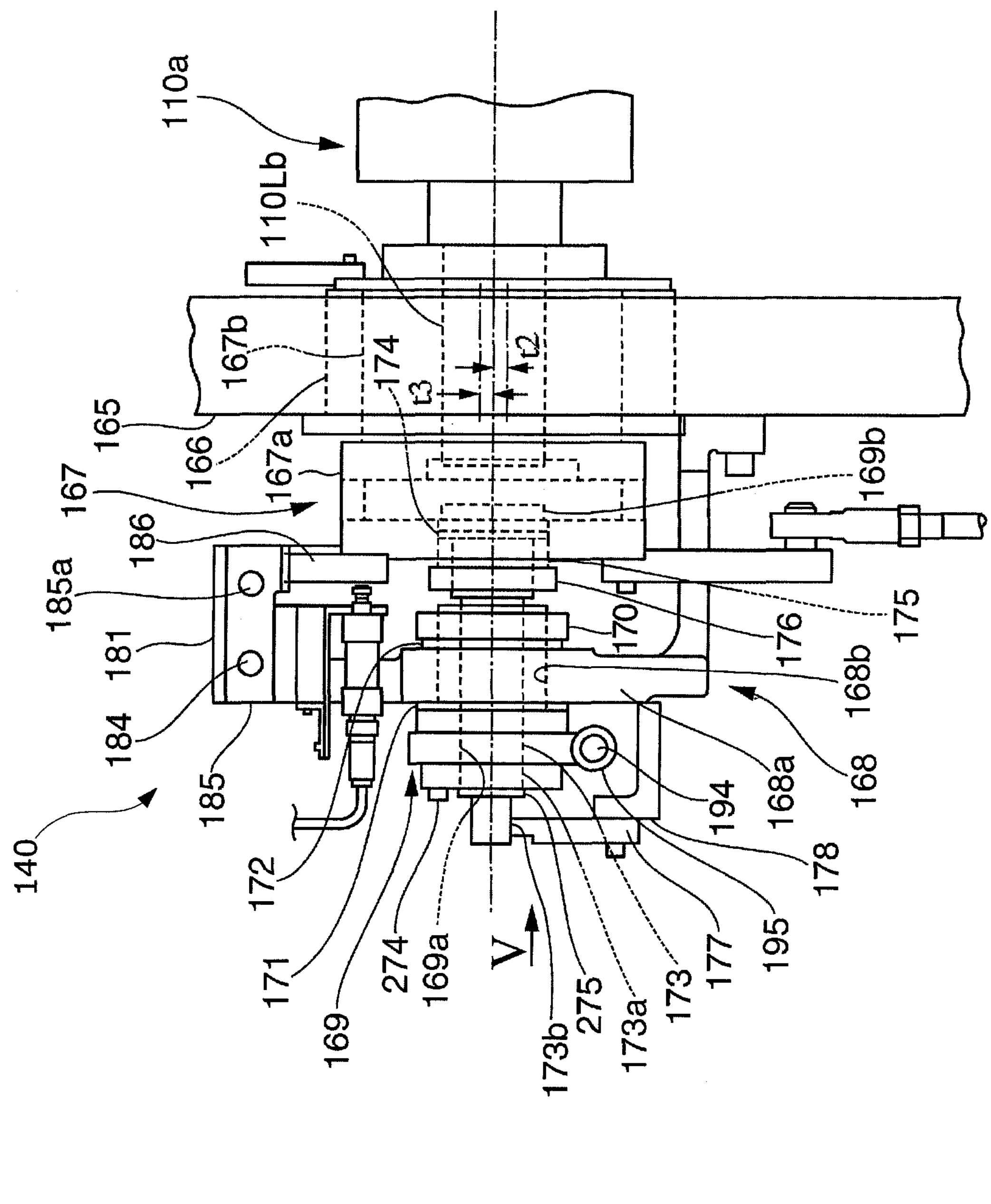
156
163
144
156a
162
164
161
151
150
148
141
143
142
110Rb
t1
110a

Fig. 3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110Lb
167b
174
t3
t2
165
166
167a
169b
167
186
185a
181
184
185
140
170
176
175
168b
168a
168
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178
195
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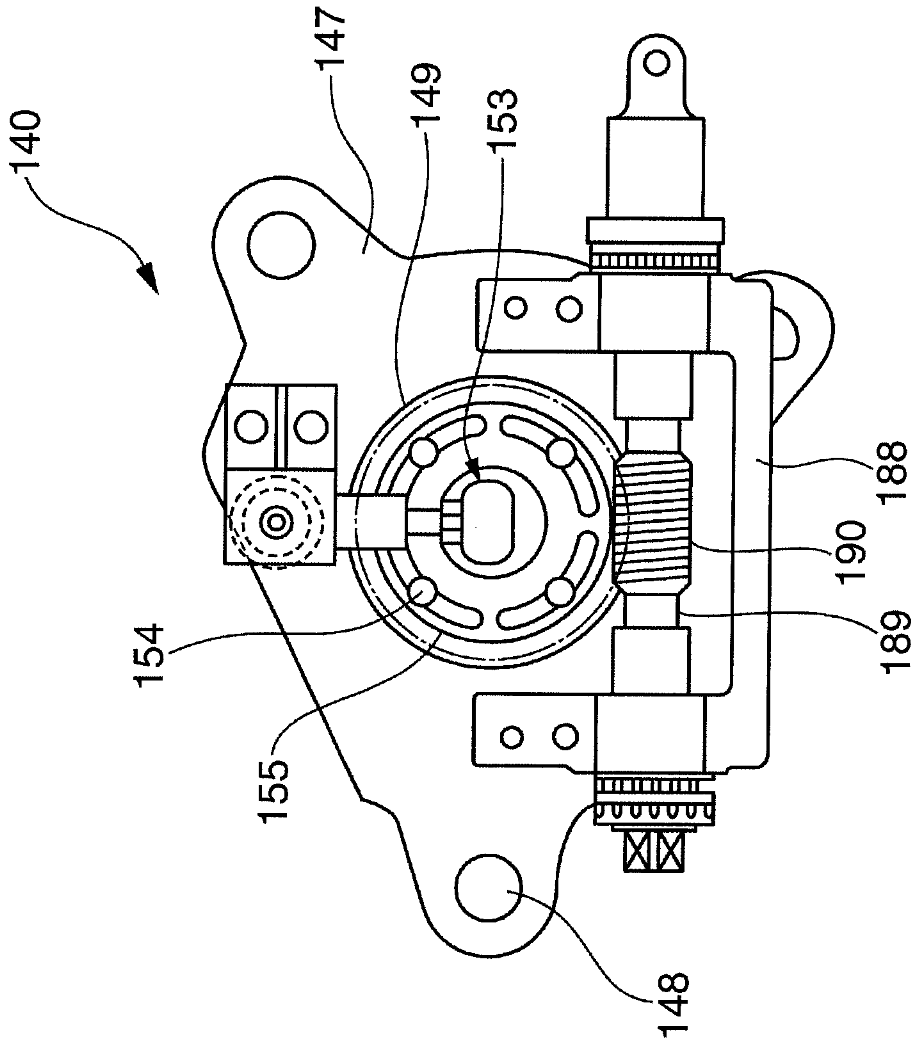
173
173a
173b
275
169a
274
169
171
172
V

Fig. 4



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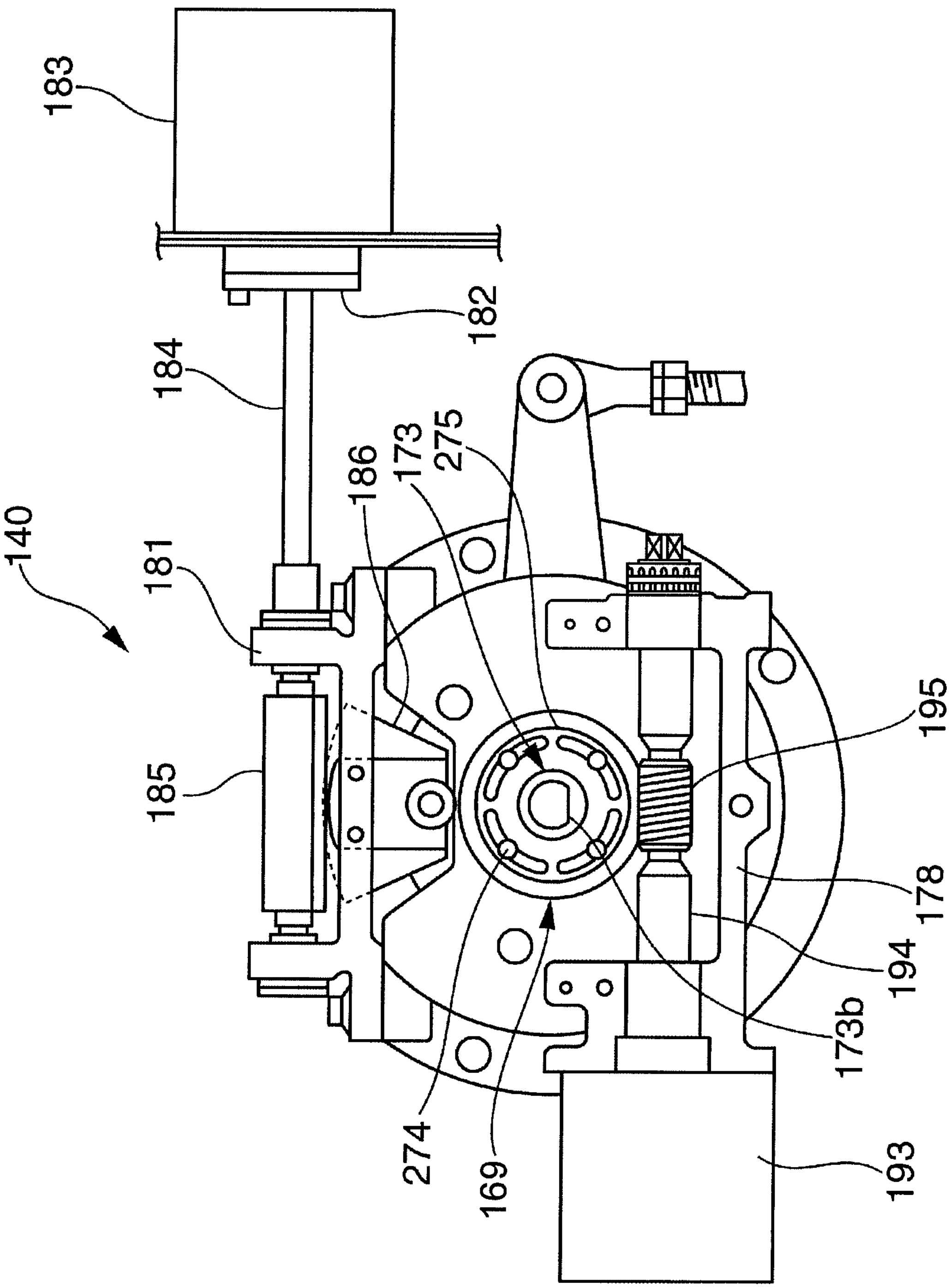
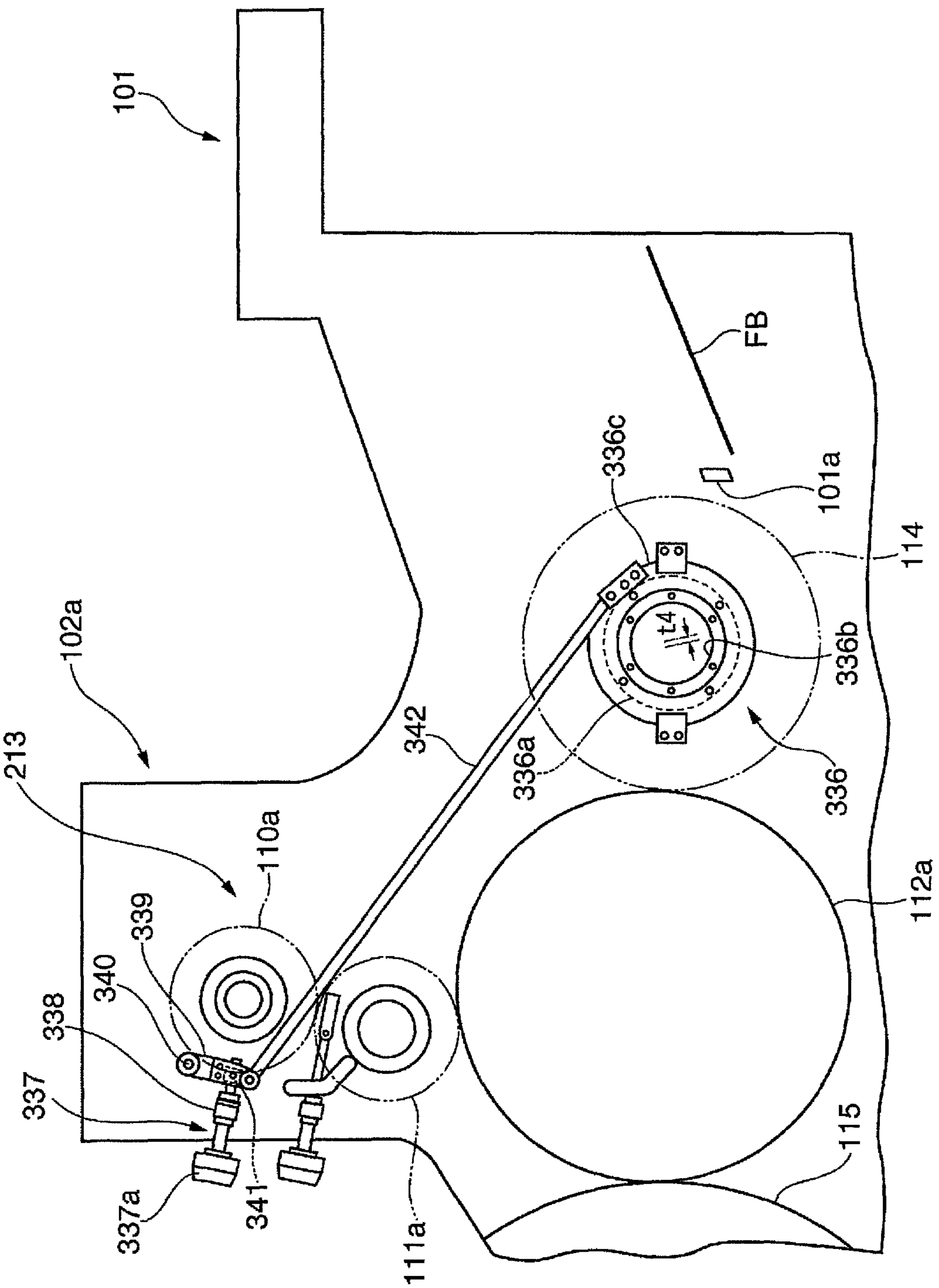


Fig. 6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FB
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336c
114
336b
t4
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336a
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102a
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110a
112a
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340
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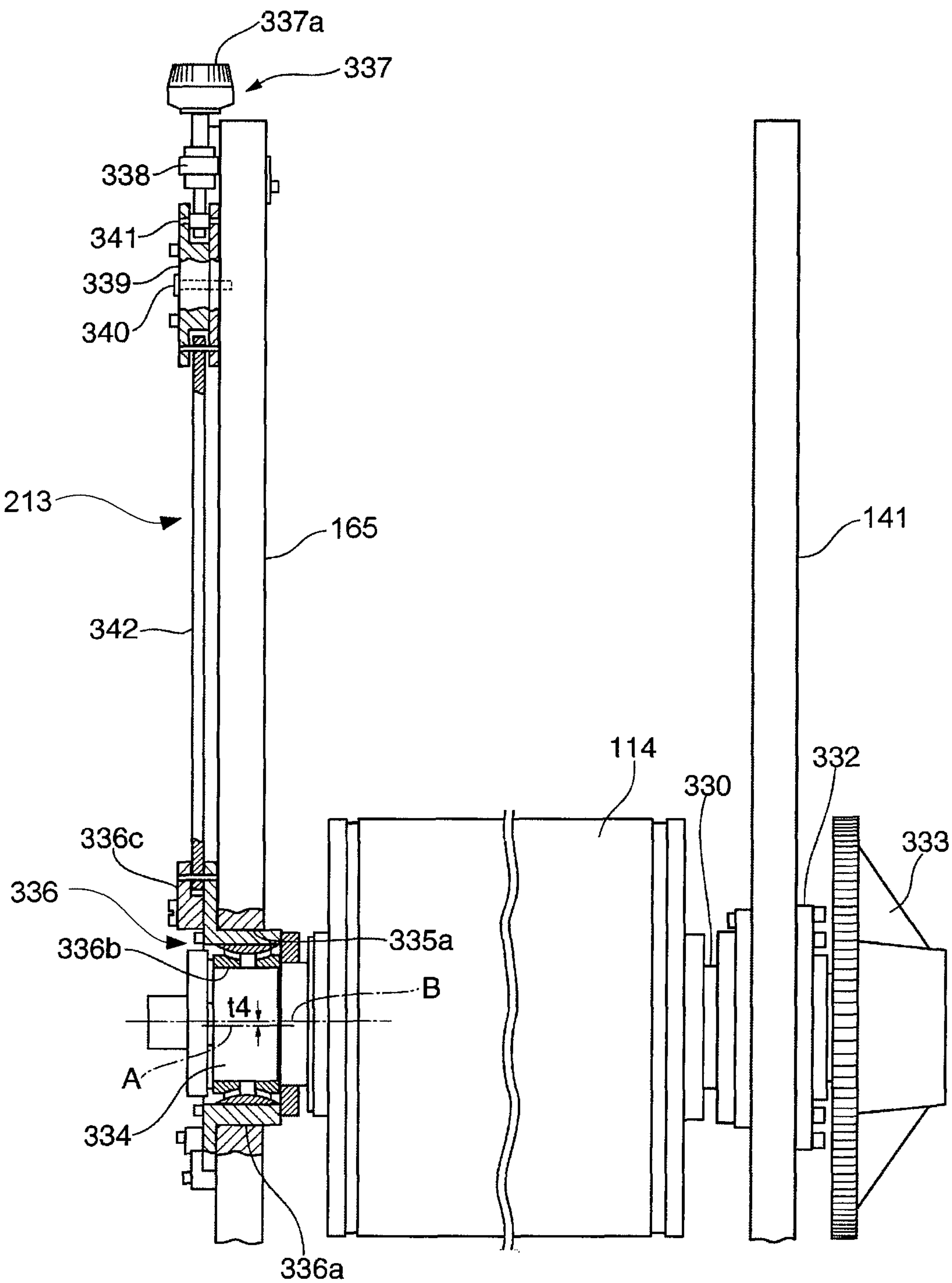
337
337a
341
111a
115

Fig. 7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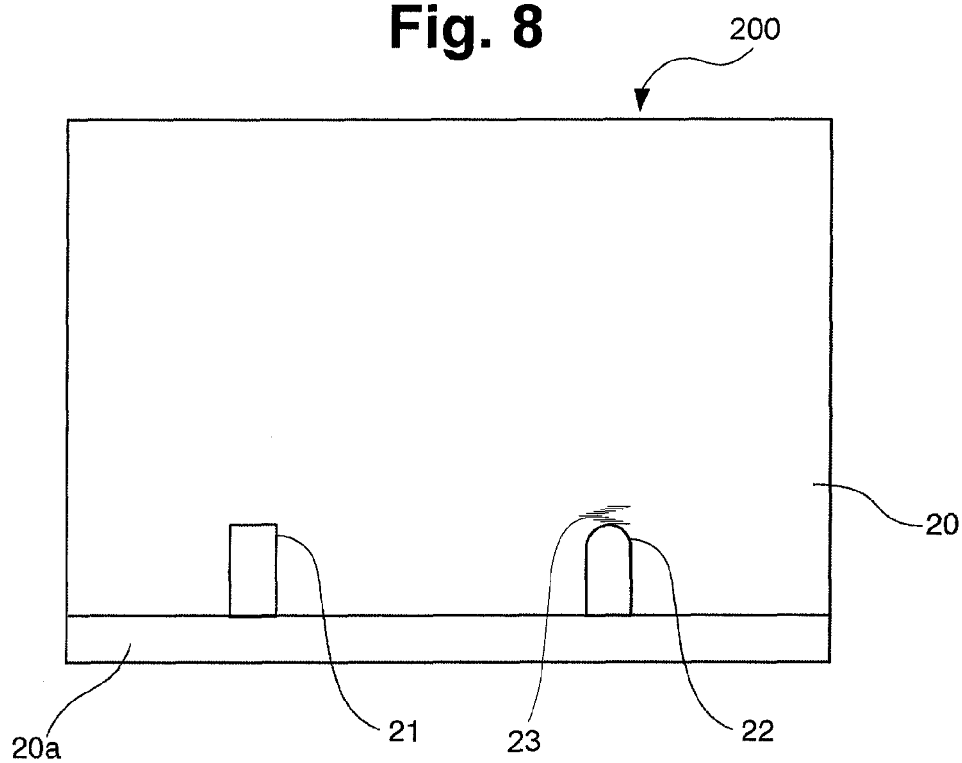
336c
336
335a
336b
B
t4
A
334
336a

Fig. 8



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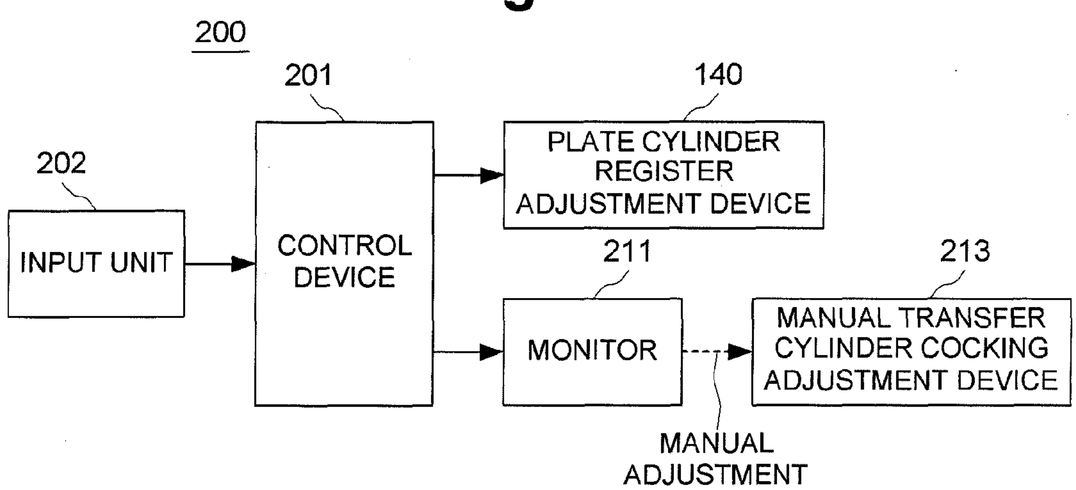

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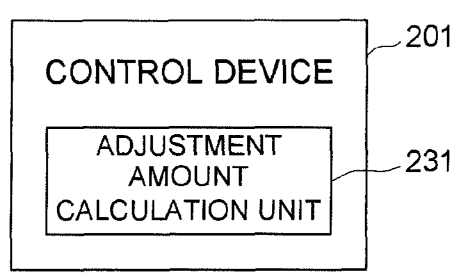

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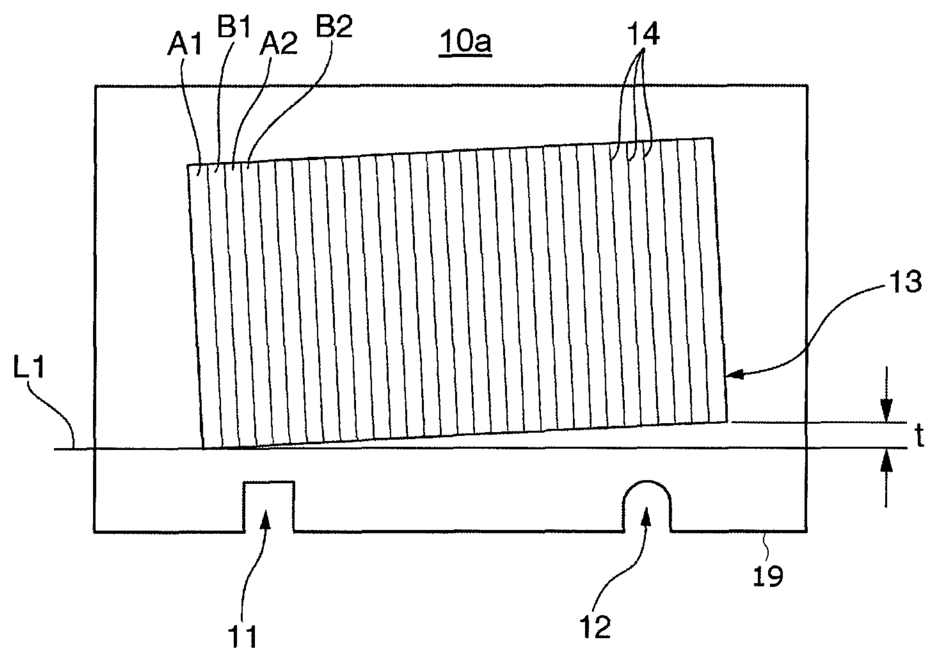

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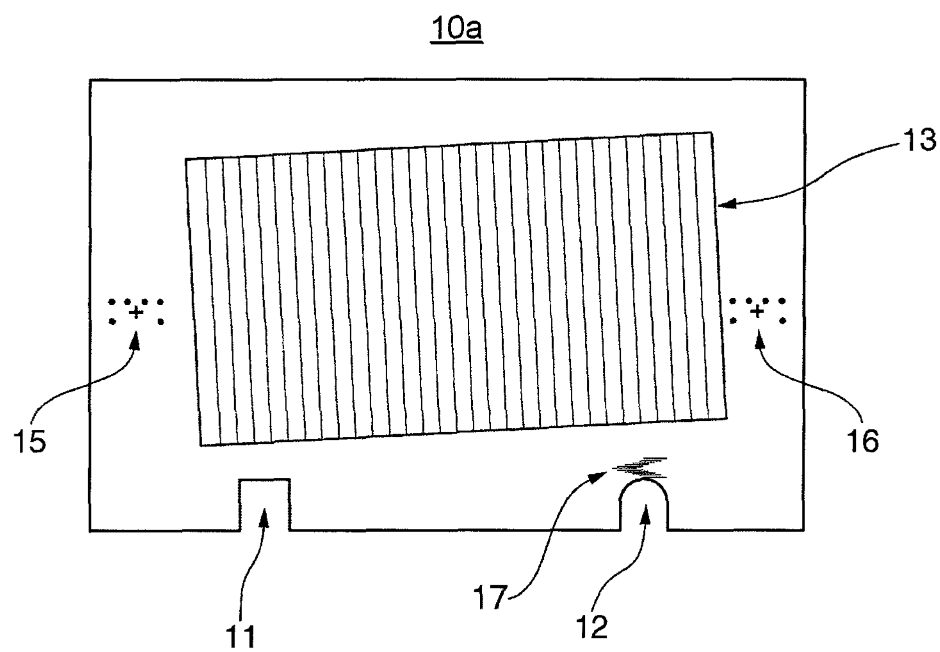


Fig. 13A

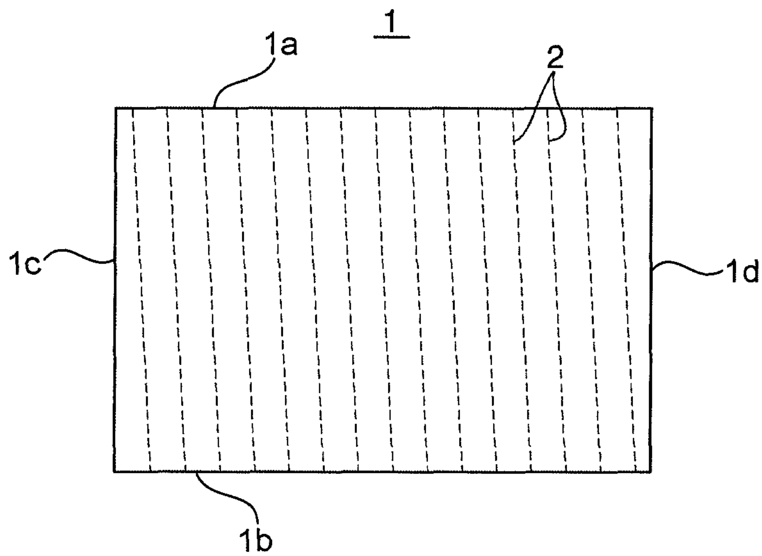
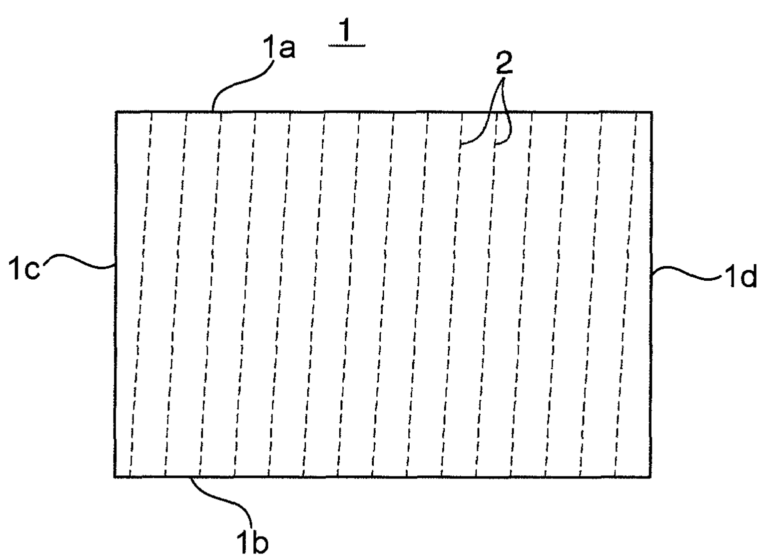


Fig. 13B



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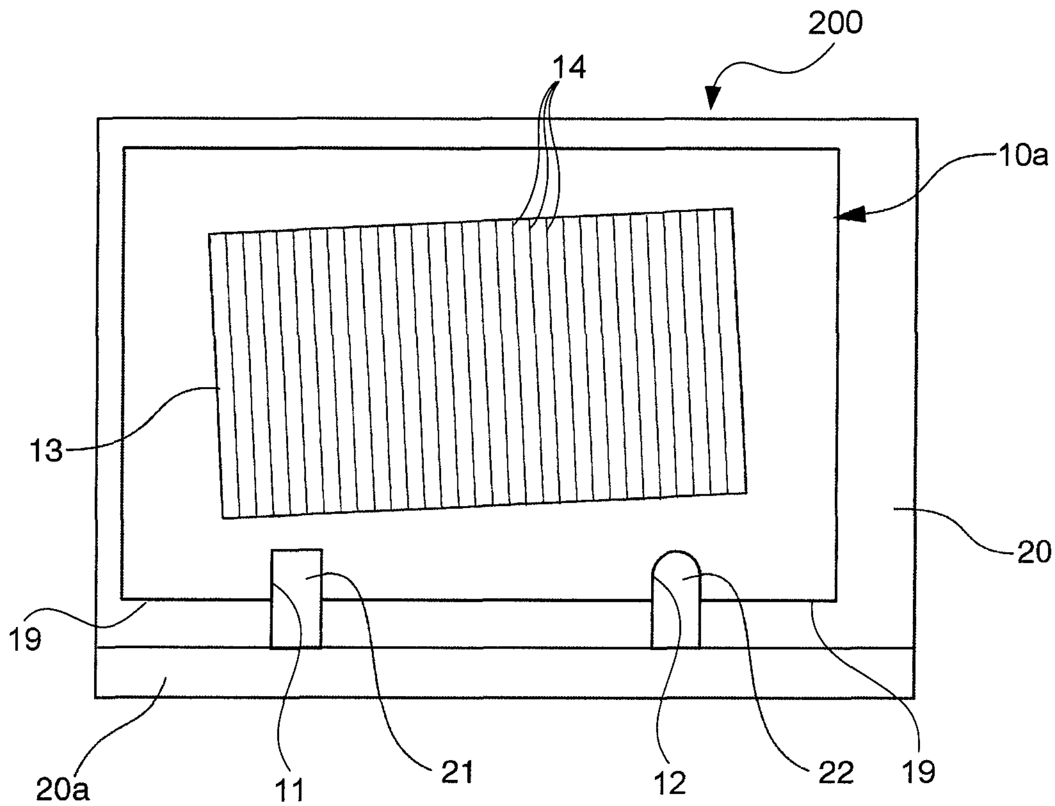

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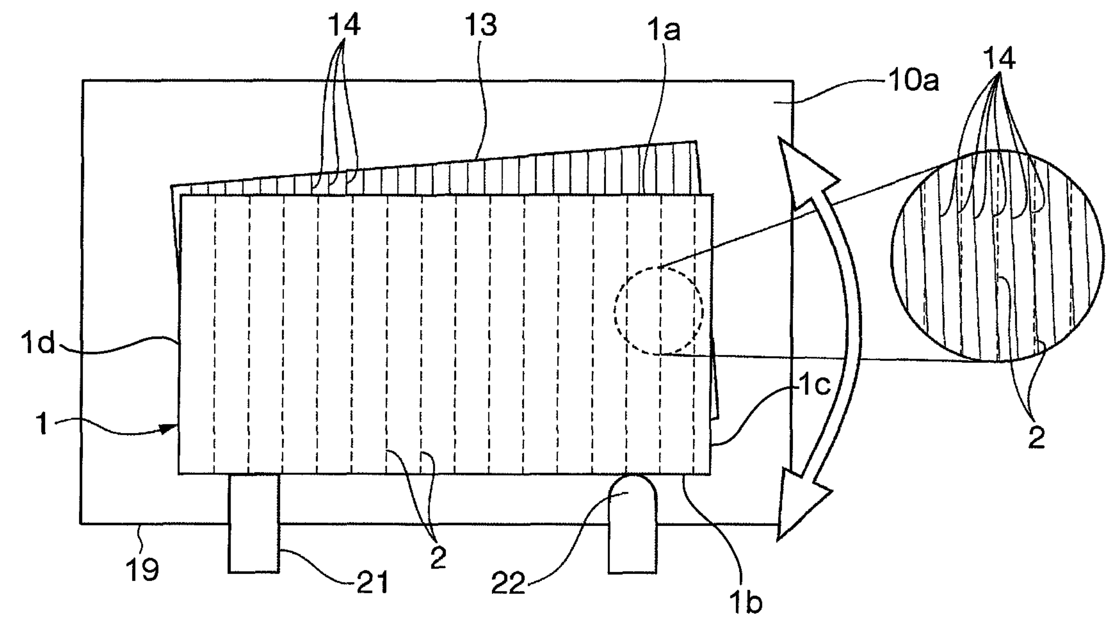

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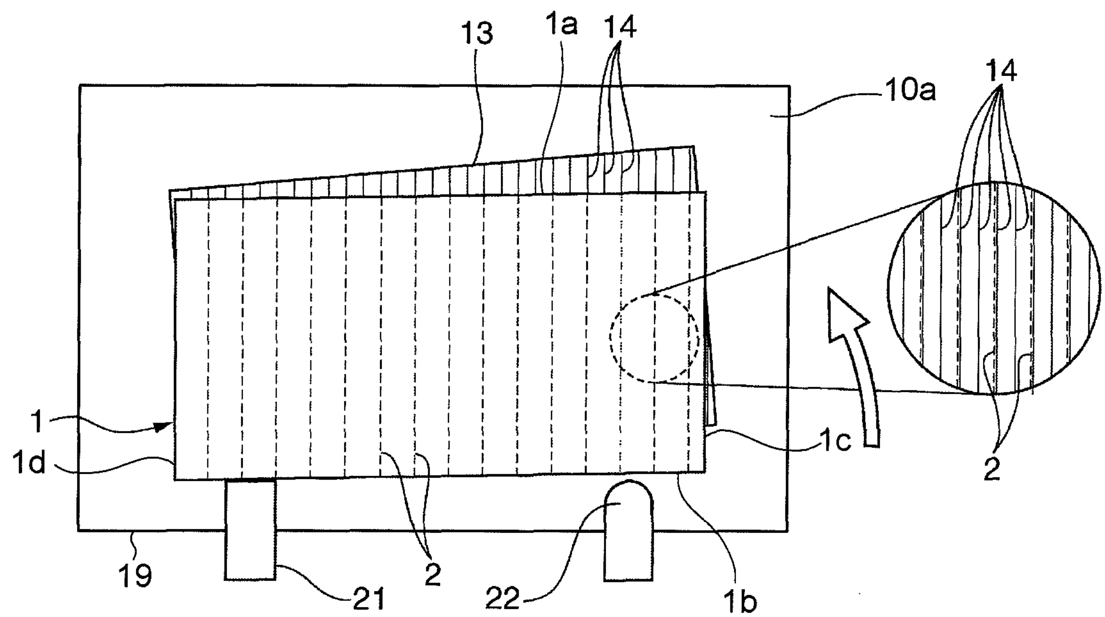

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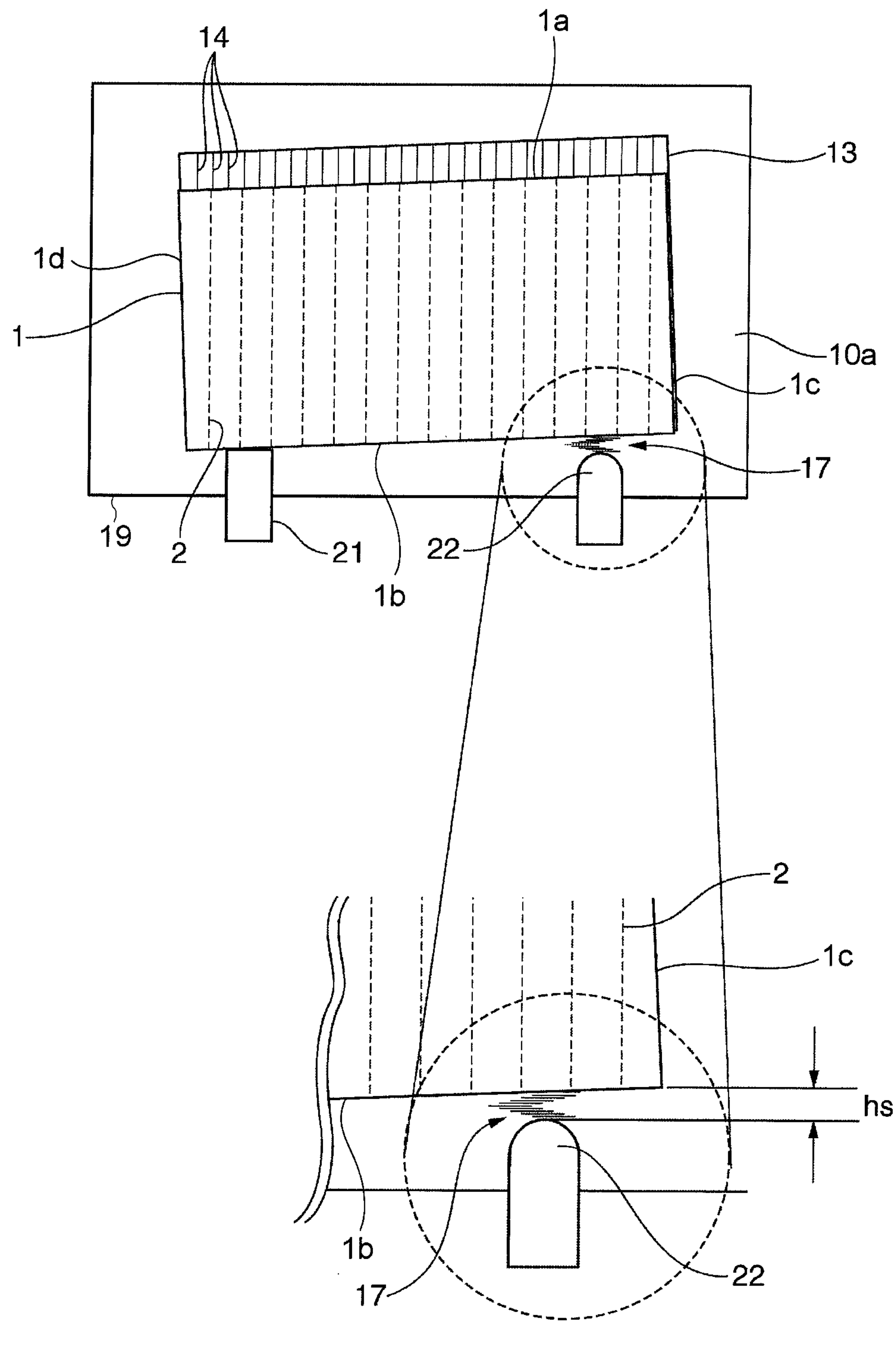

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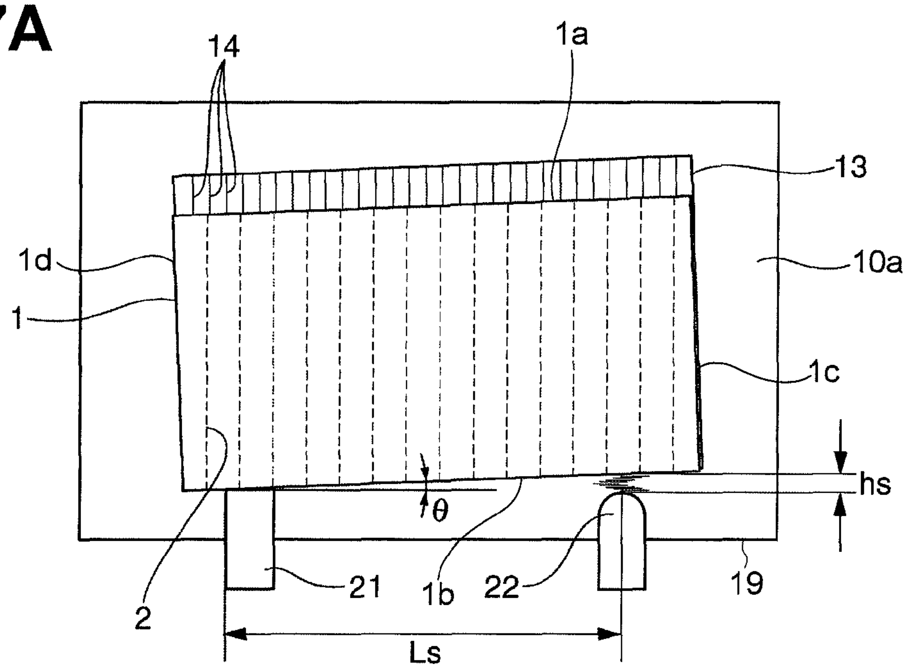


Fig. 17B

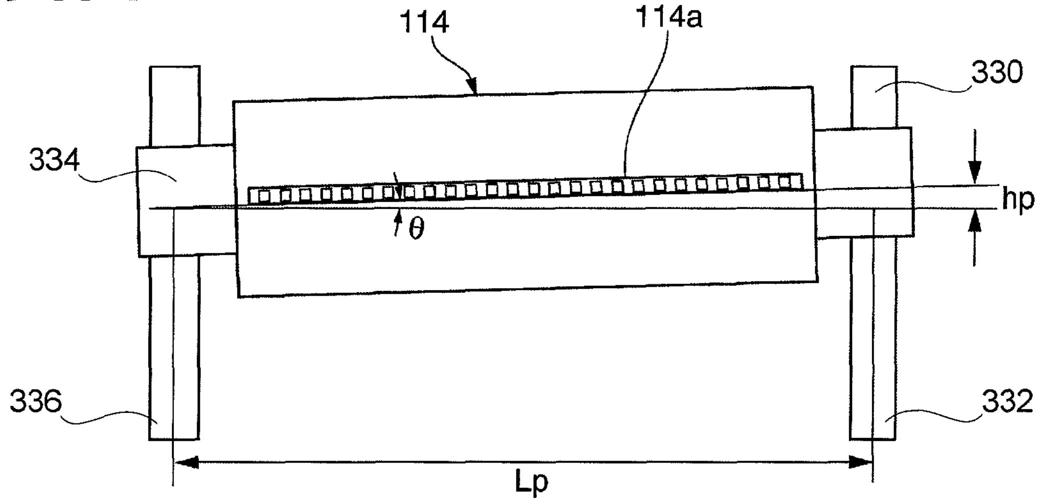
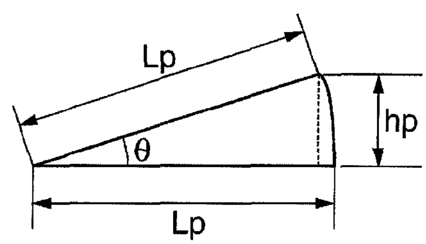


Fig. 17C



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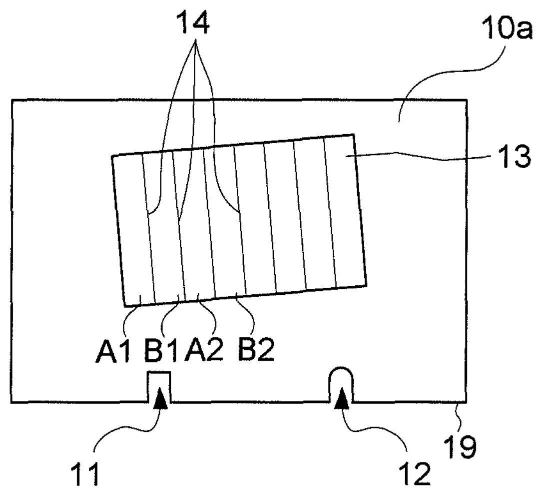

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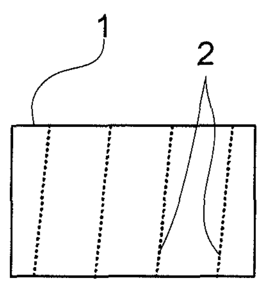
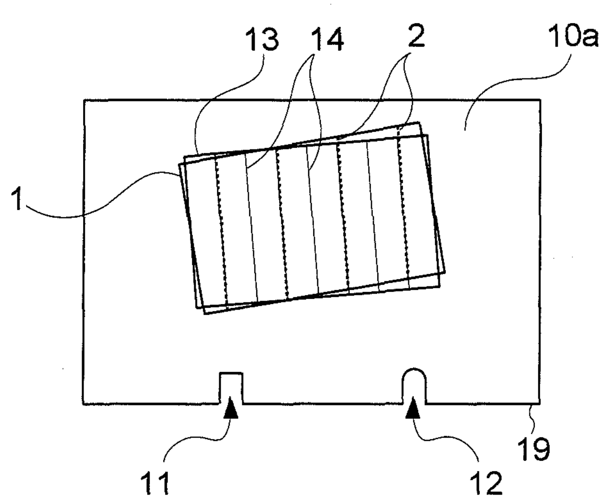


Fig. 18C



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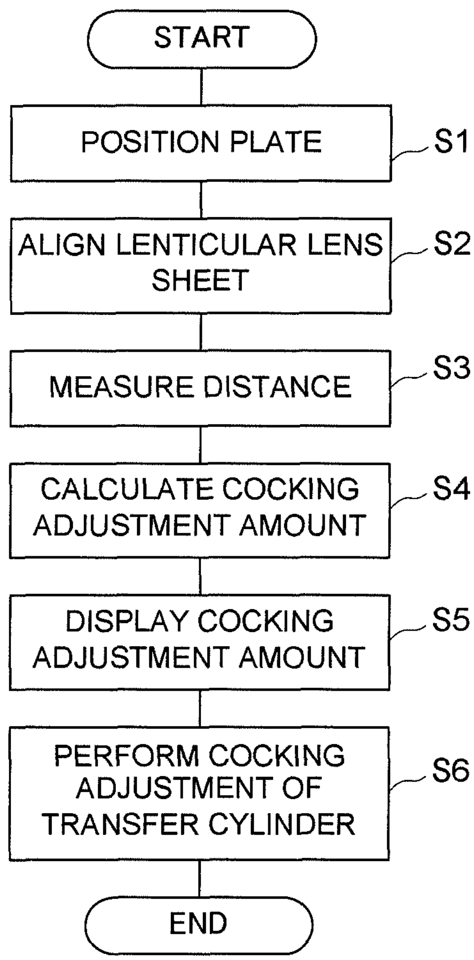
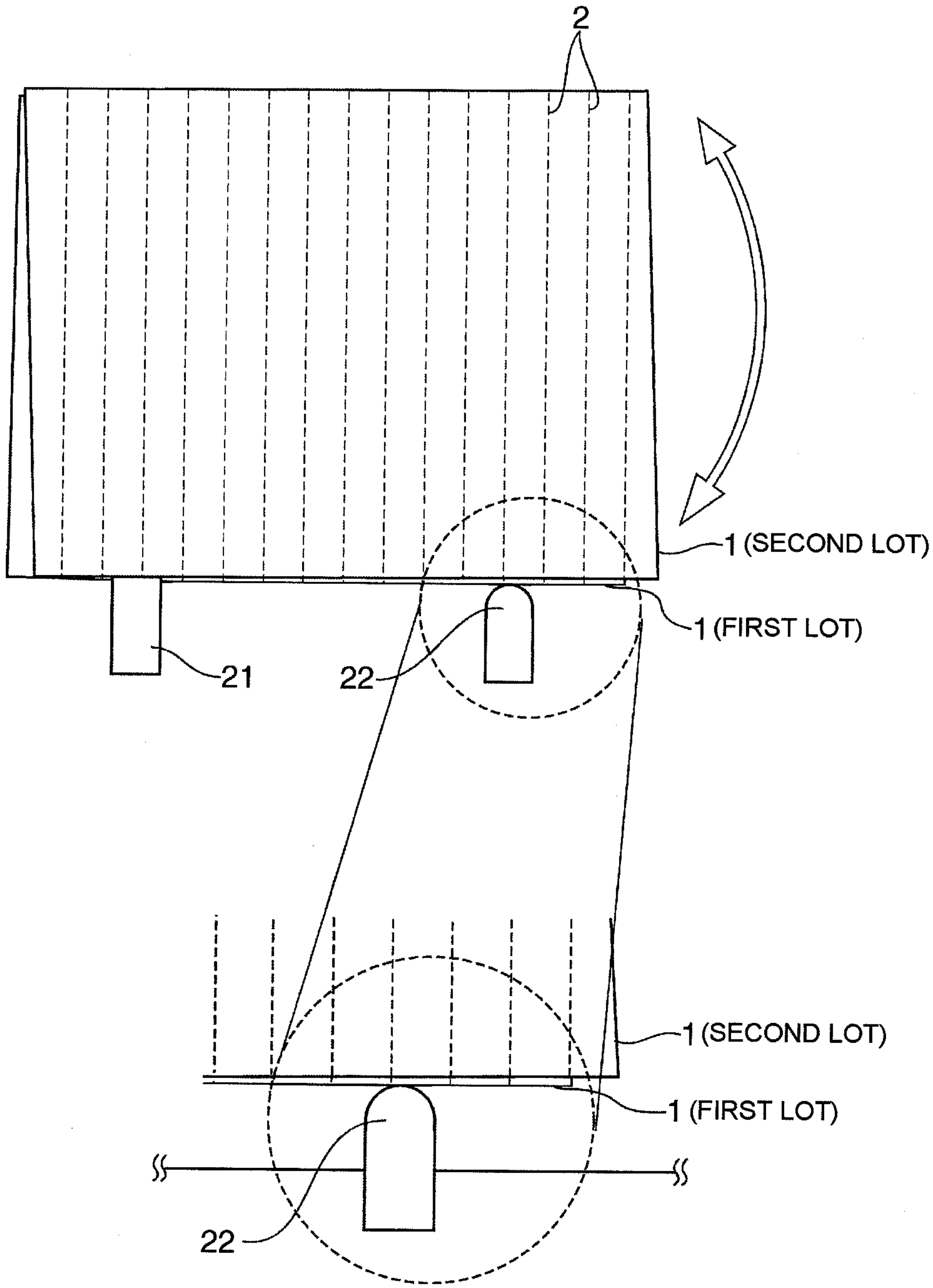

START
POSITION PLATE
S1
ALIGN LENTICULAR LENS SHEET
S2
MEASURE DISTANCE
S3
CALCULATE COCKING ADJUSTMENT AMOUNT
S4
DISPLAY COCKING ADJUSTMENT AMOUNT
S5
PERFORM COCKING ADJUSTMENT OF TRANSFER CYLINDER
S6
END

Fig. 20



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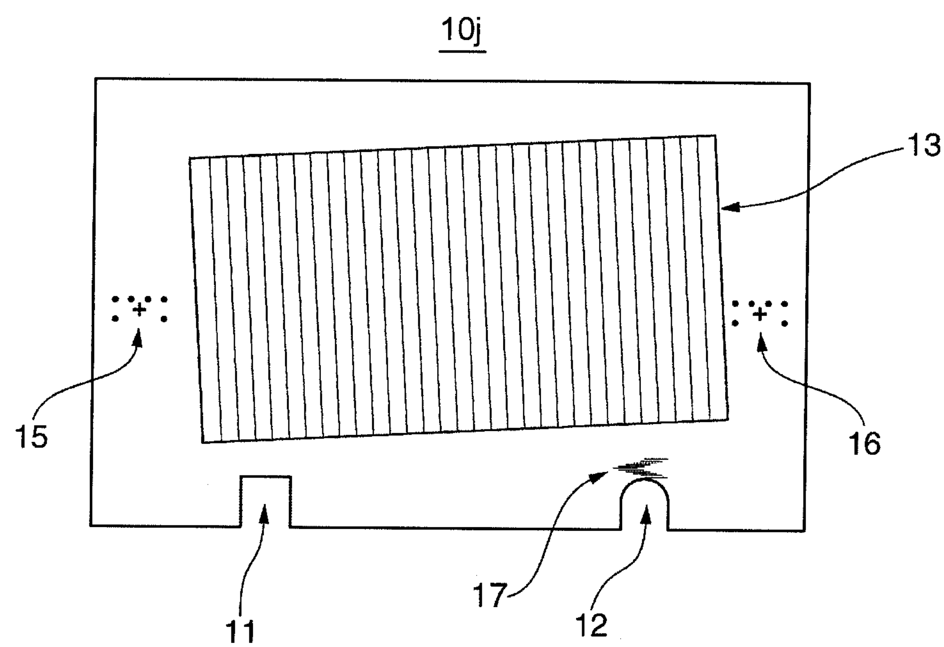


Fig. 22

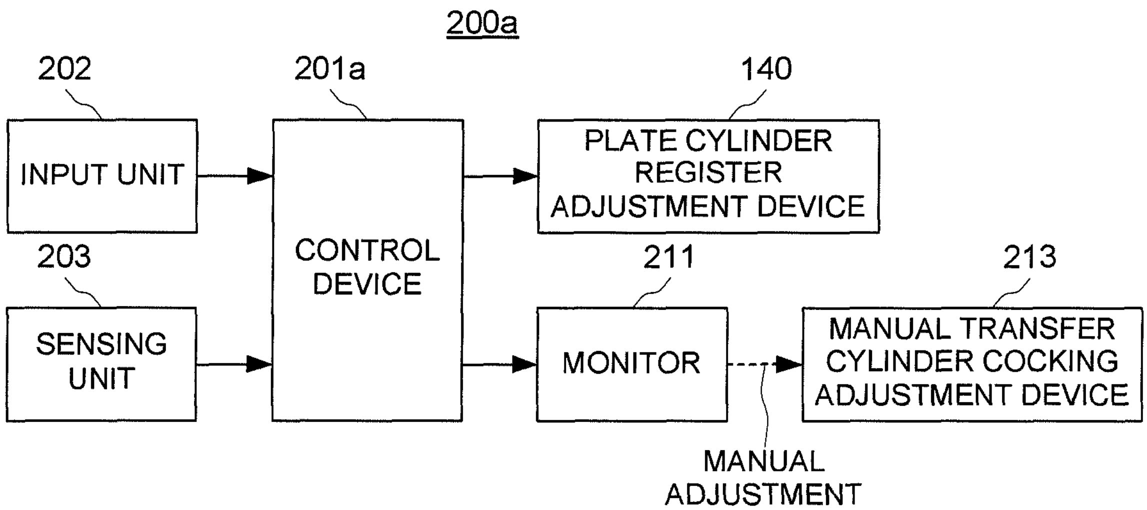

200a
202
INPUT UNIT
203
SENSING UNIT
201a
CONTROL DEVICE
140
PLATE CYLINDER REGISTER ADJUSTMENT DEVICE
211
MONITOR
213
MANUAL TRANSFER CYLINDER COCKING ADJUSTMENT DEVICE
MANUAL ADJUSTMENT

Fig. 23

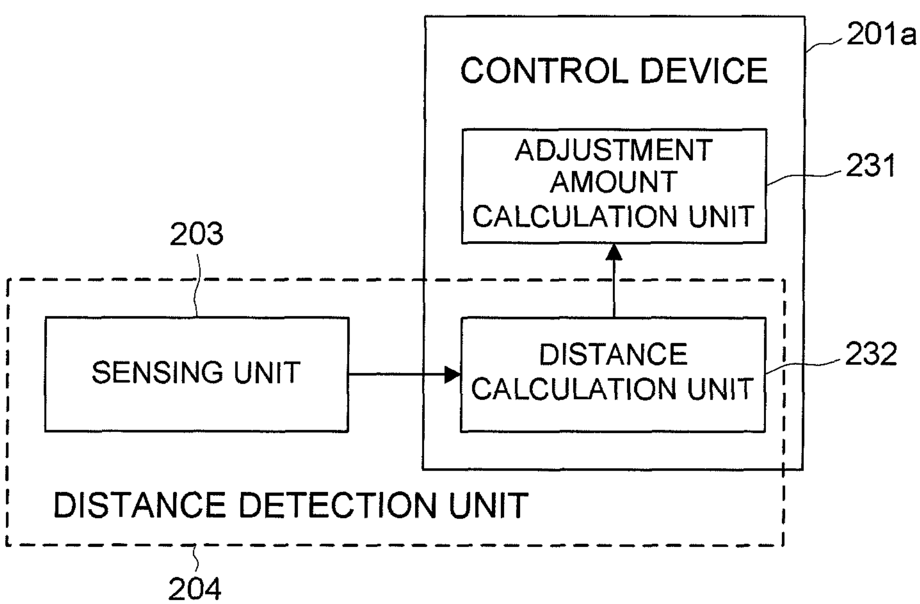
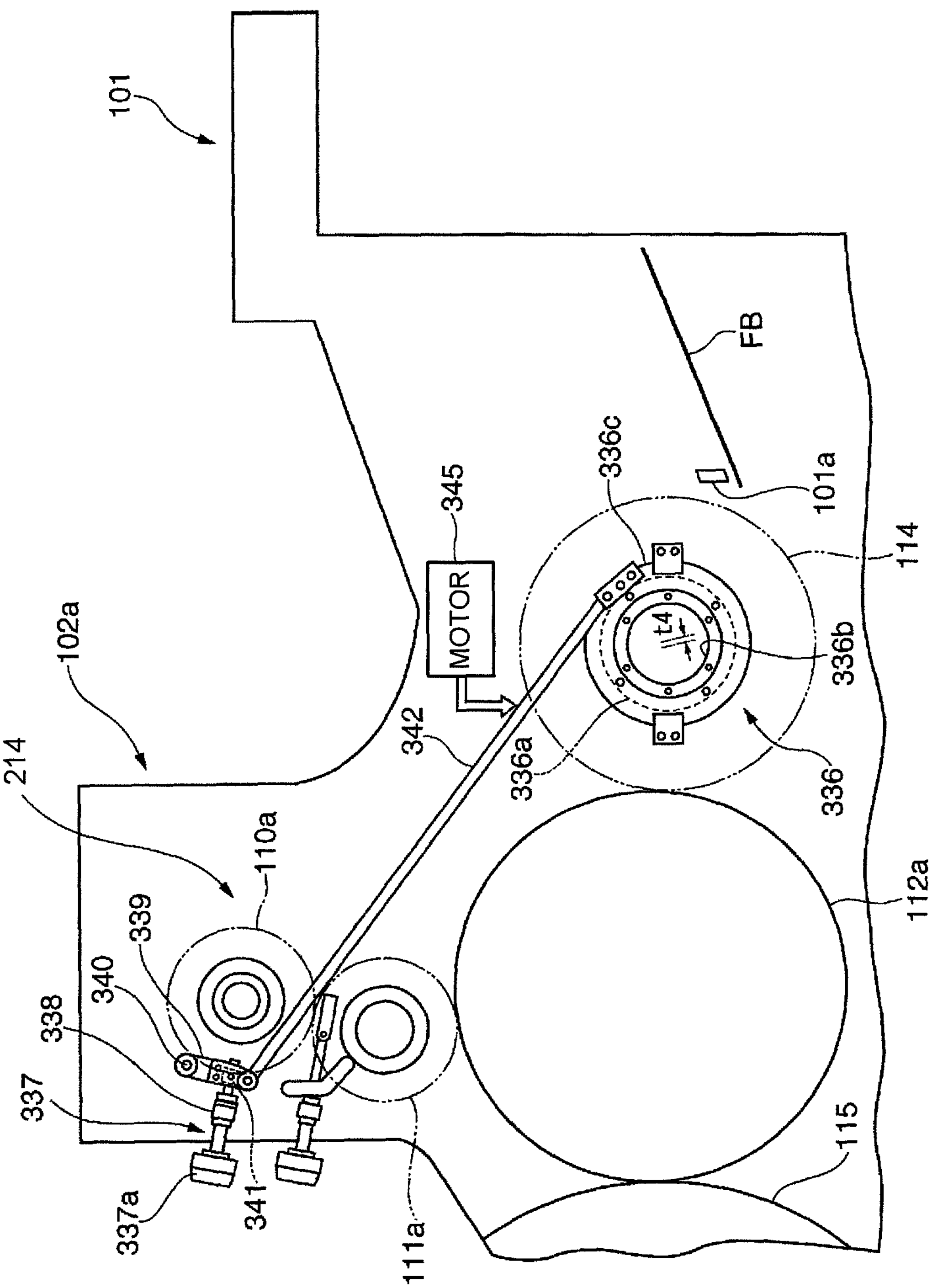

CONTROL DEVICE
201a
ADJUSTMENT AMOUNT CALCULATION UNIT
231
203
SENSING UNIT
DISTANCE CALCULATION UNIT
232
DISTANCE DETECTION UNIT
204

Fig. 24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MOTOR
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337a
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111a
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Fig. 25

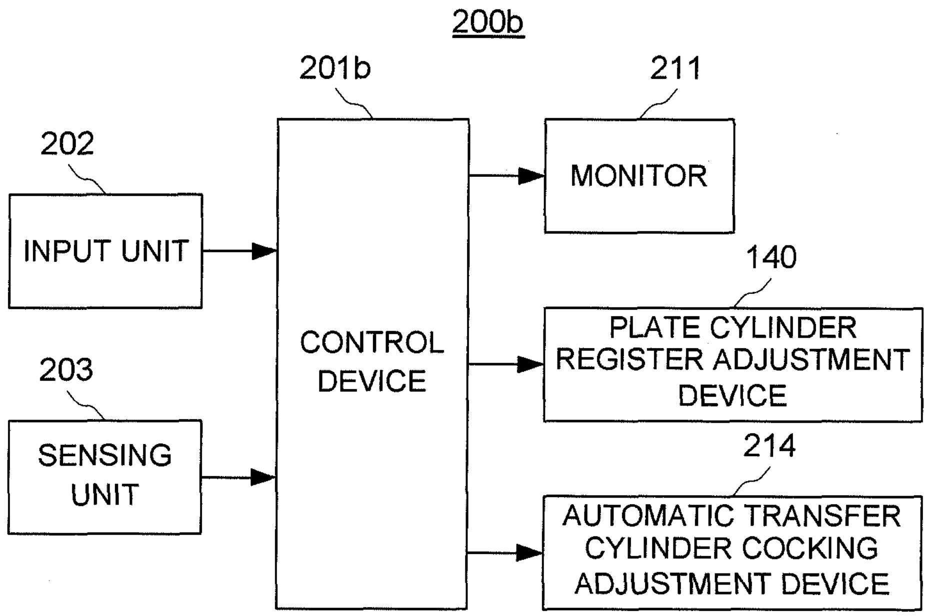
200b
201b
211
202
INPUT UNIT
MONITOR
140
CONTROL DEVICE
PLATE CYLINDER REGISTER ADJUSTMENT DEVICE
203
SENSING UNIT
214
AUTOMATIC TRANSFER CYLINDER COCKING ADJUSTMENT DEVICE

Fig. 26

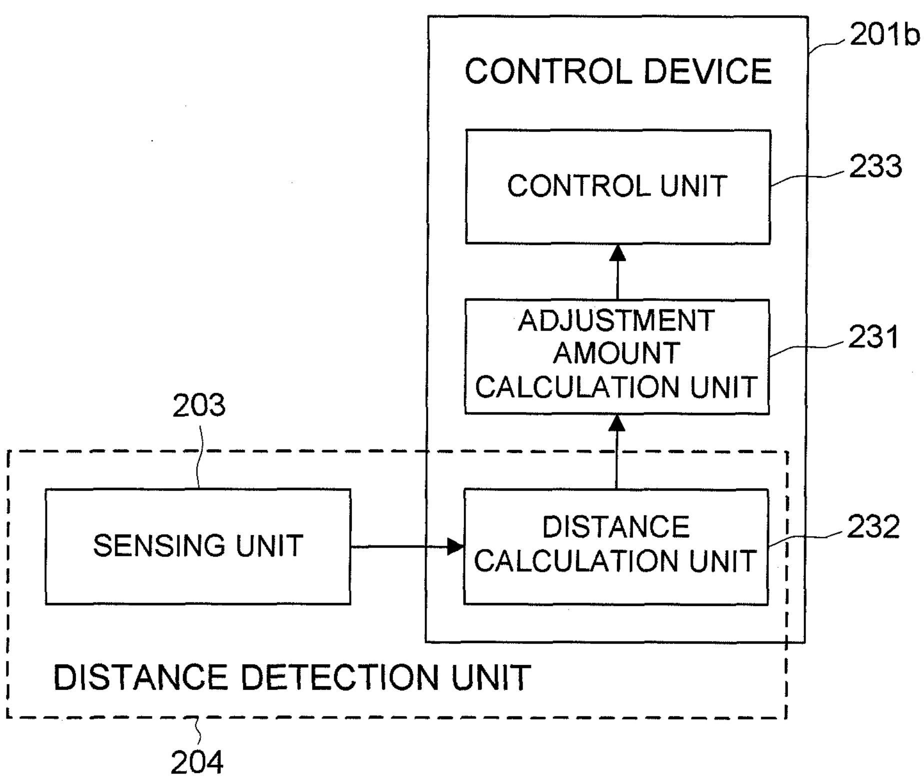
CONTROL DEVICE
201b
CONTROL UNIT
233
ADJUSTMENT AMOUNT CALCULATION UNIT
231
203
SENSING UNIT
DISTANCE CALCULATION UNIT
232
DISTANCE DETECTION UNIT
204

Fig. 27

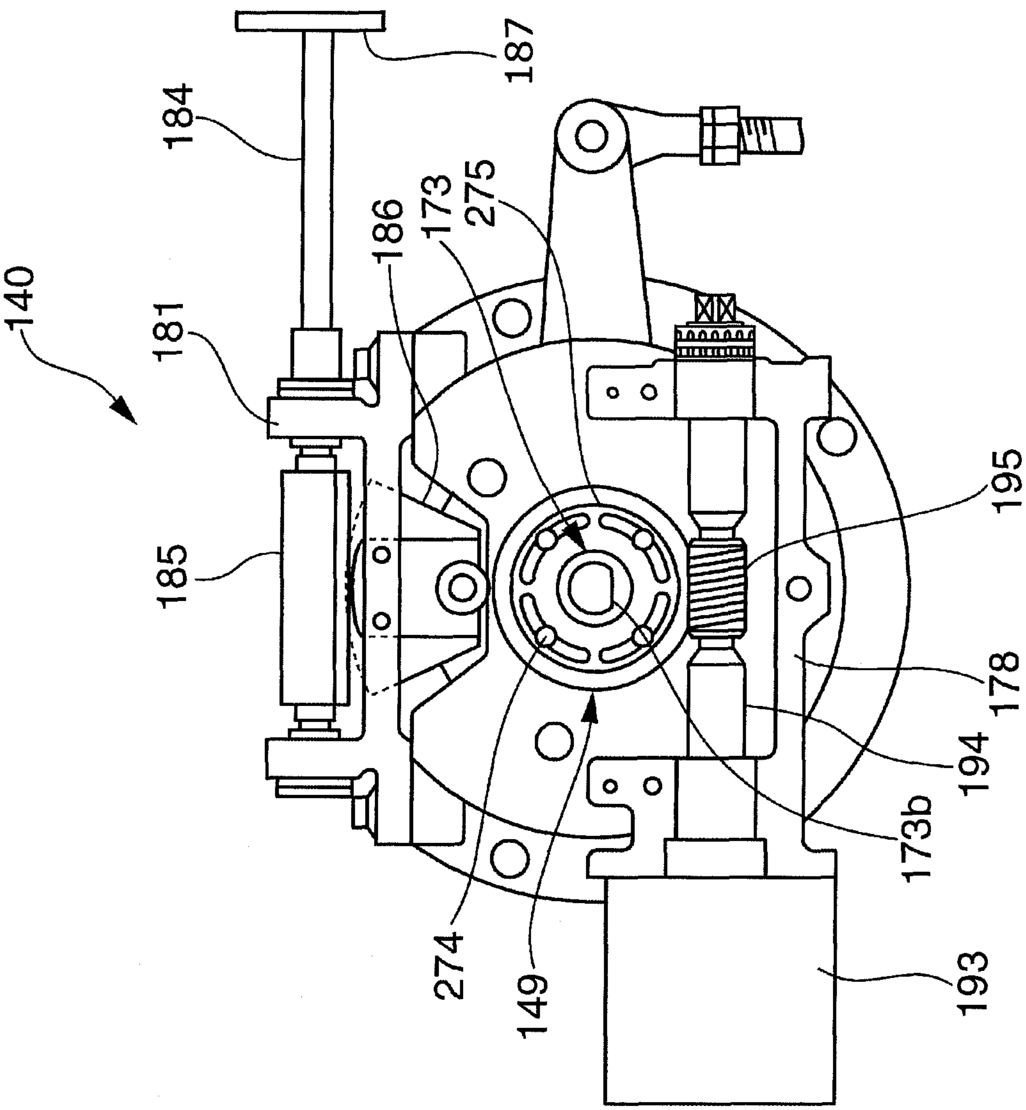

Fig. 28

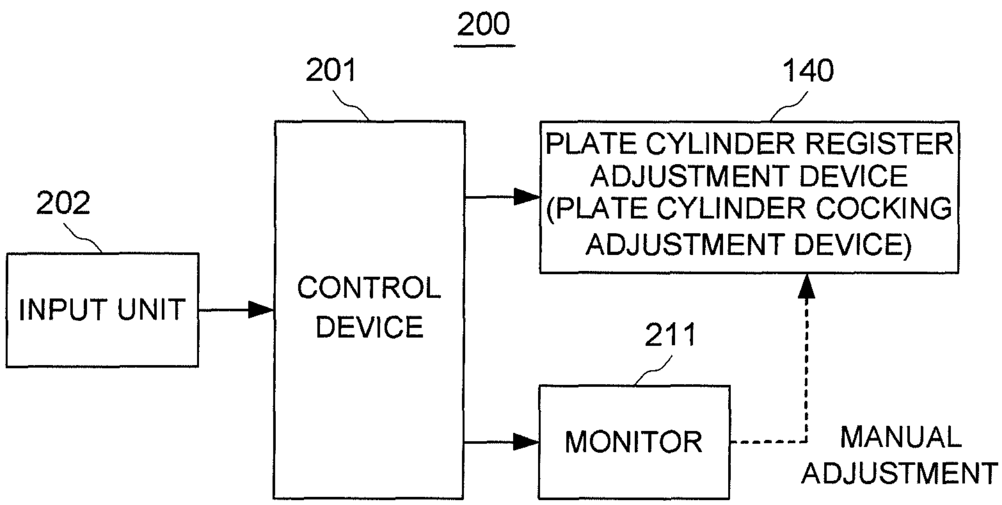
200
201
140
202
PLATE CYLINDER REGISTER ADJUSTMENT DEVICE (PLATE CYLINDER COCKING ADJUSTMENT DEVICE)
INPUT UNIT
CONTROL DEVICE
211
MONITOR
MANUAL ADJUSTMENT

Fig. 29

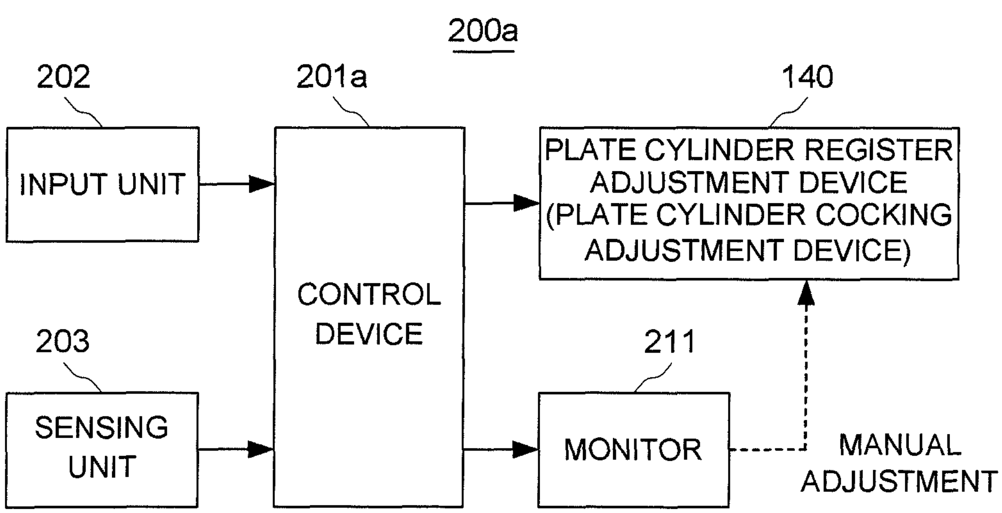
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PLATE CYLINDER REGISTER ADJUSTMENT DEVICE (PLATE CYLINDER COCKING ADJUSTMENT DEVICE)
CONTROL DEVICE
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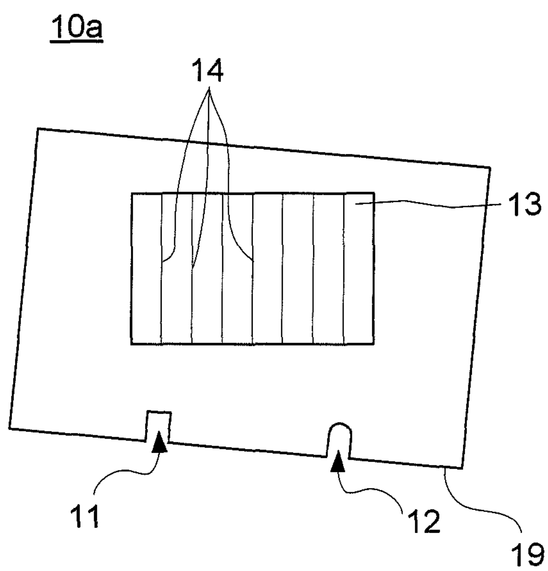
211
SENSING UNIT
MONITOR
MANUAL ADJUSTMENT

Fig. 30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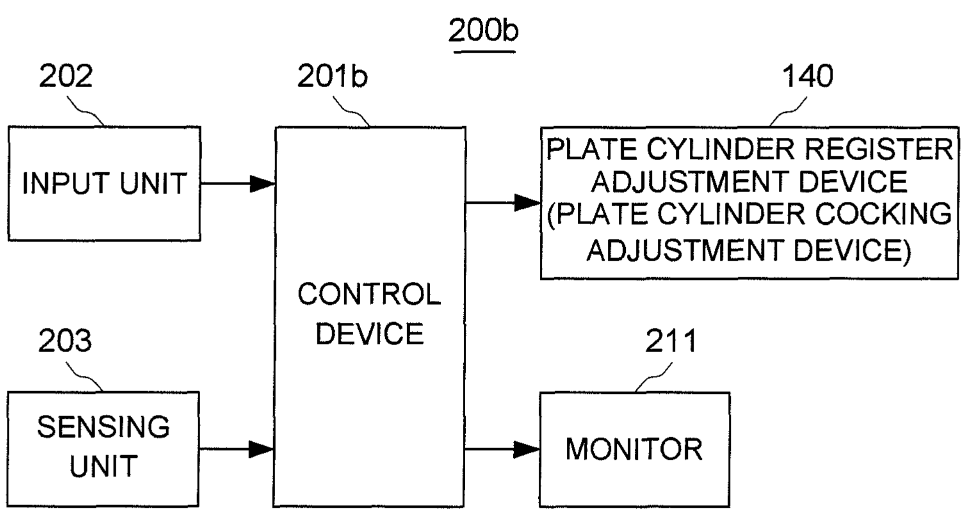
12
19

Fig. 31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CONTROL DEVICE
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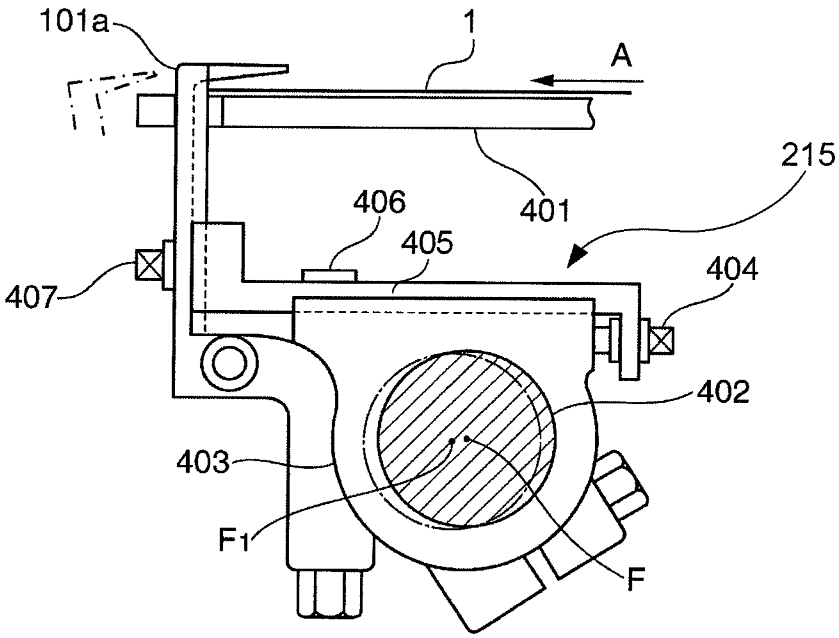
211
SENSING UNIT
MONITOR

Fig. 32



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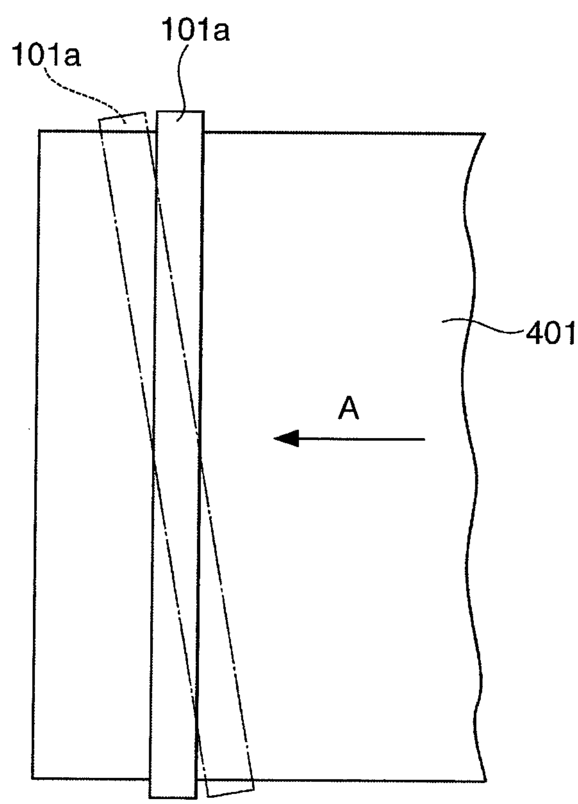
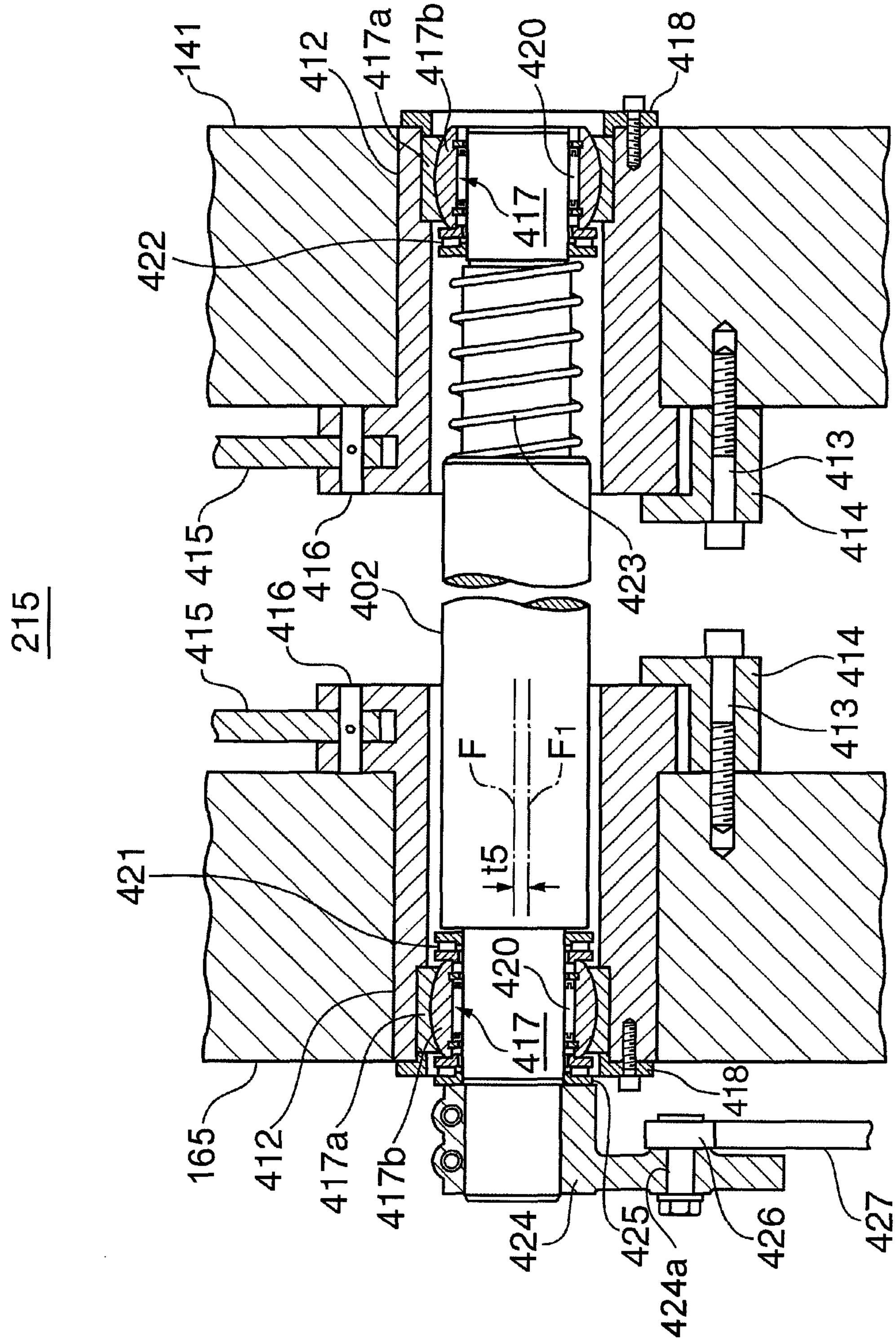


Fig. 34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F1
t5
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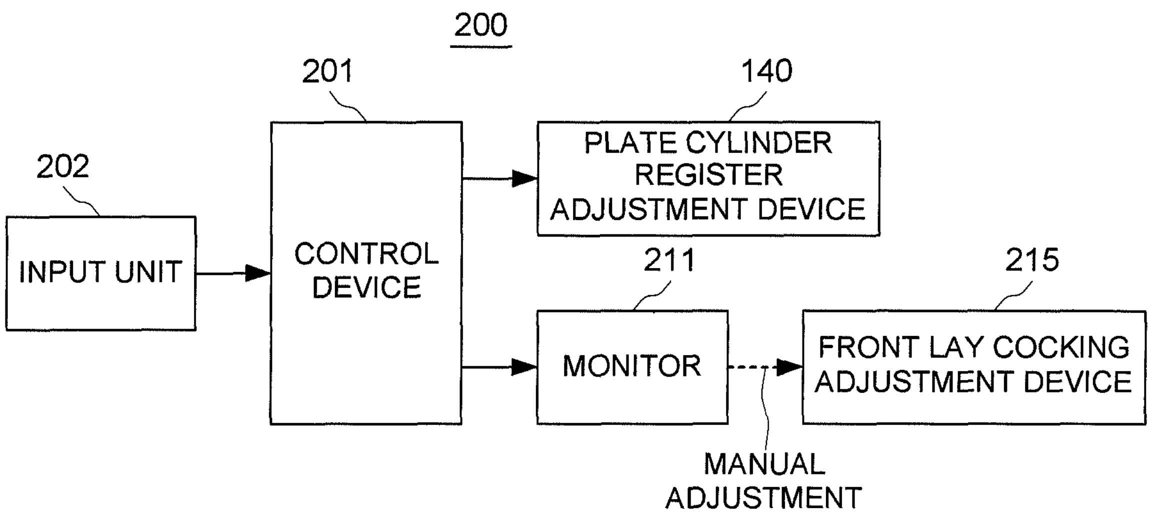
Fig. 35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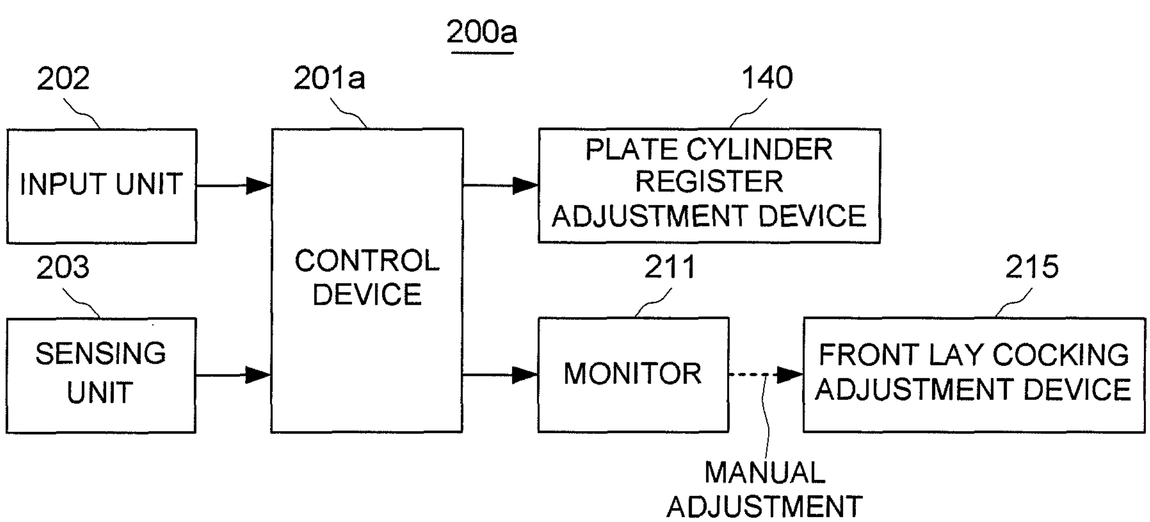
MONITOR
FRONT LAY COCKING ADJUSTMENT DEVICE
MANUAL ADJUSTMENT

Fig. 36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CONTROL DEVICE
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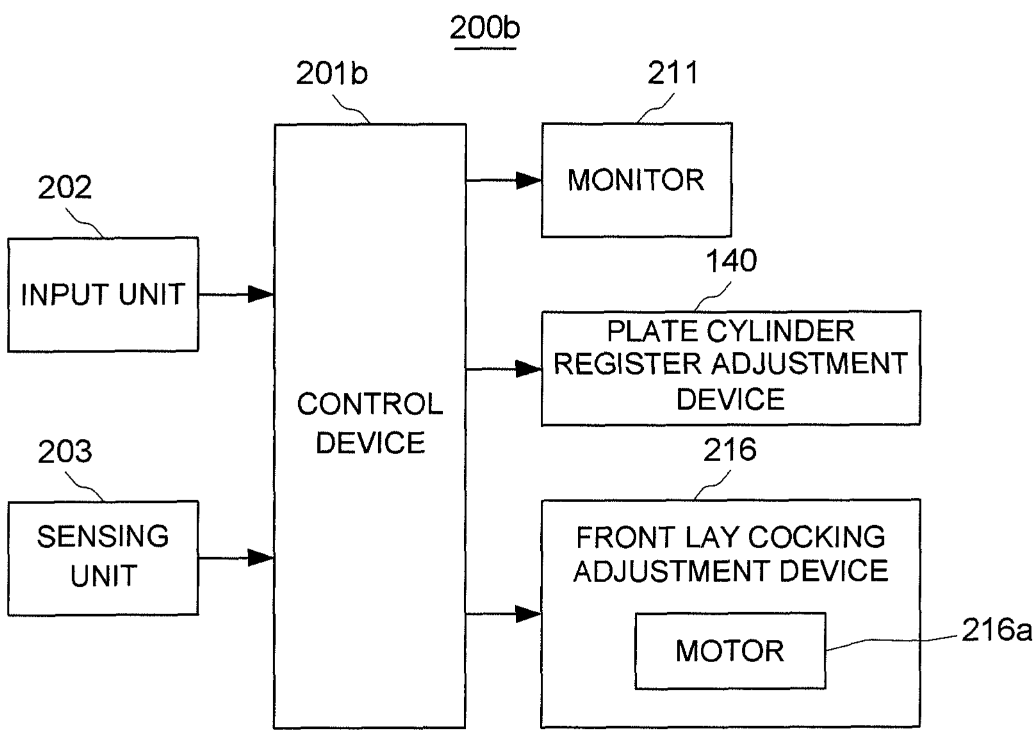
SENSING UNIT
MONITOR
FRONT LAY COCKING ADJUSTMENT DEVICE
MANUAL ADJUSTMENT

Fig. 37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MONITOR
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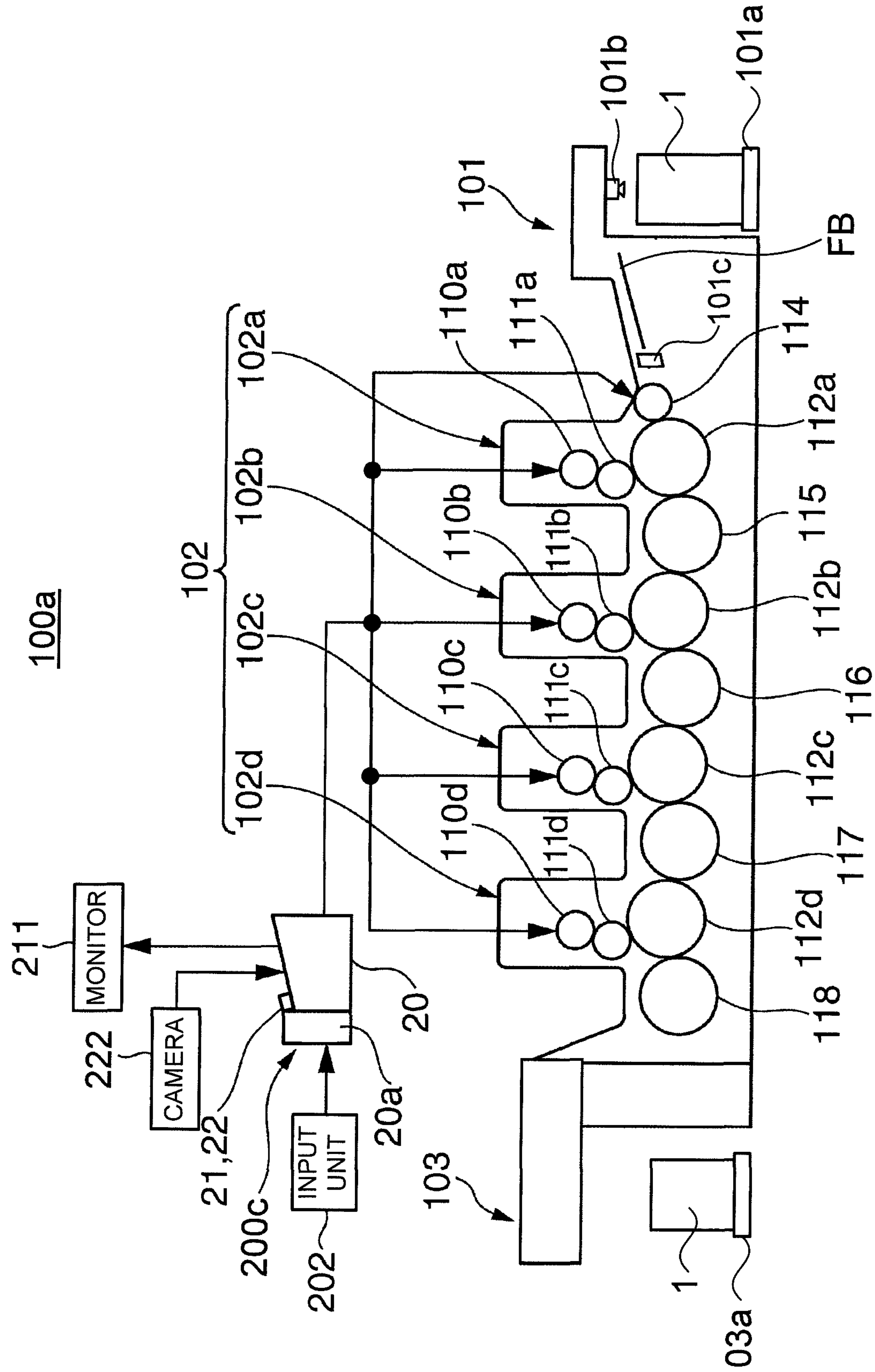
CONTROL DEVICE
203
216
SENSING UNIT
FRONT LAY COCKING ADJUSTMENT DEVICE
MOTOR
216a

Fig. 38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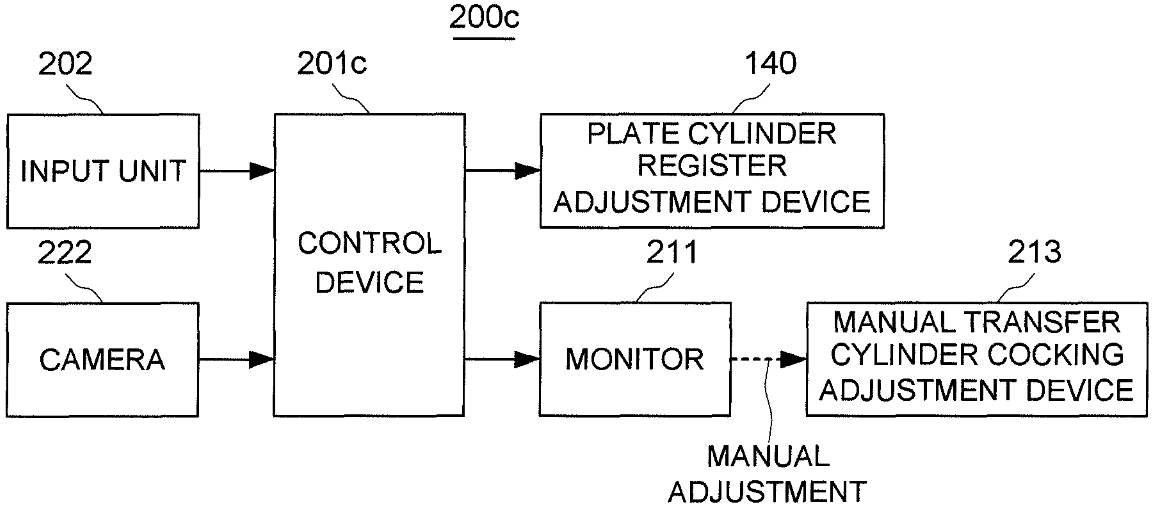
200c

Fig. 39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211
MONITOR
213
MANUAL TRANSFER CYLINDER COCKING ADJUSTMENT DEVICE
MANUAL ADJUSTMENT

Fig. 40

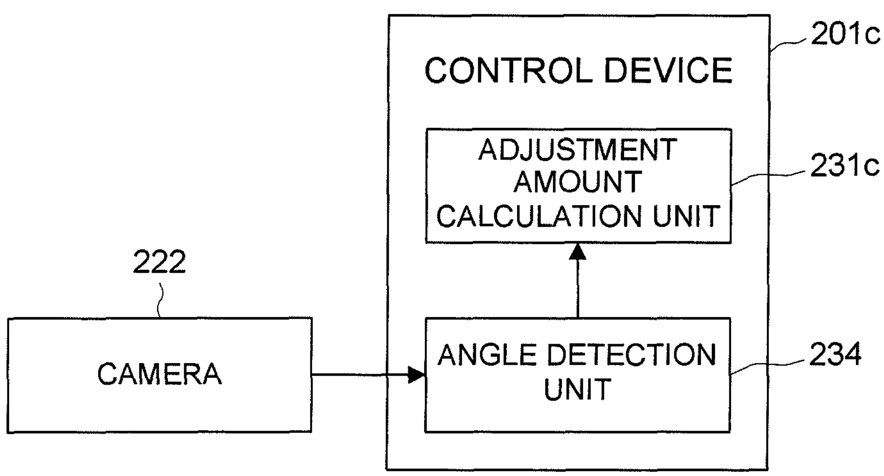

CONTROL DEVICE
201c
ADJUSTMENT AMOUNT CALCULATION UNIT
231c
222
CAMERA
ANGLE DETECTION UNIT
234

Fig. 41A

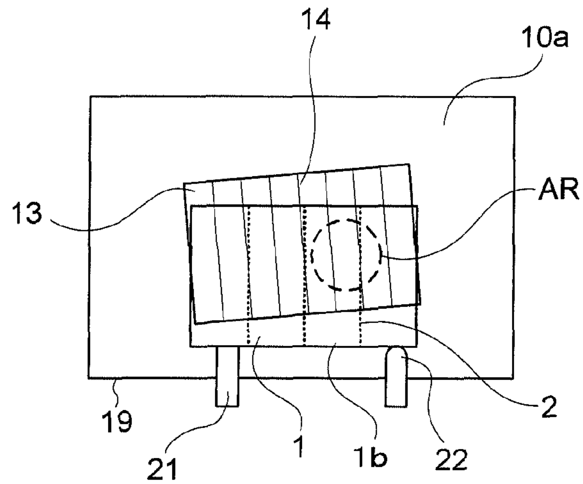


Fig. 41B

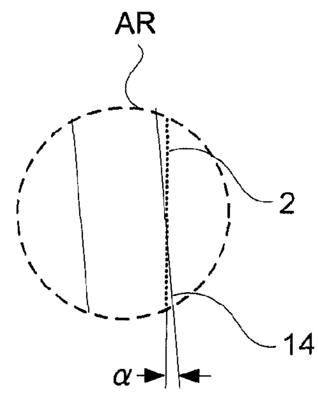


Fig. 42

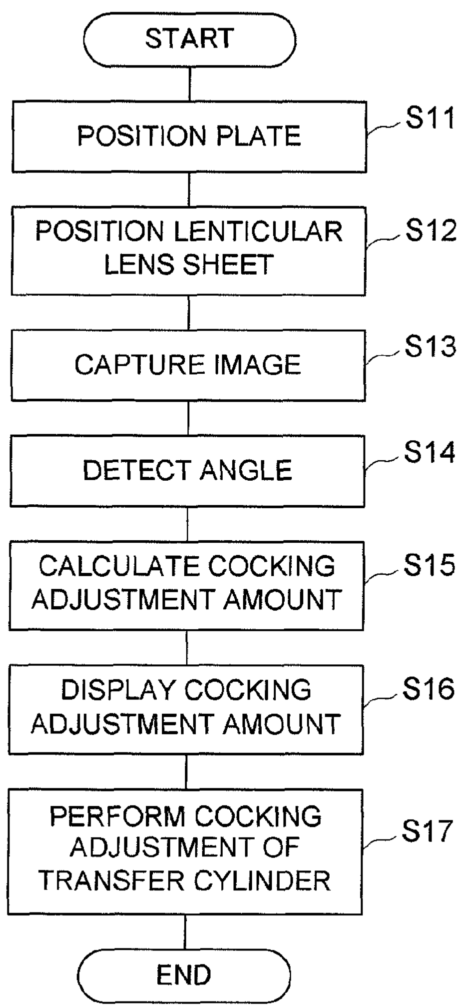


Fig. 43

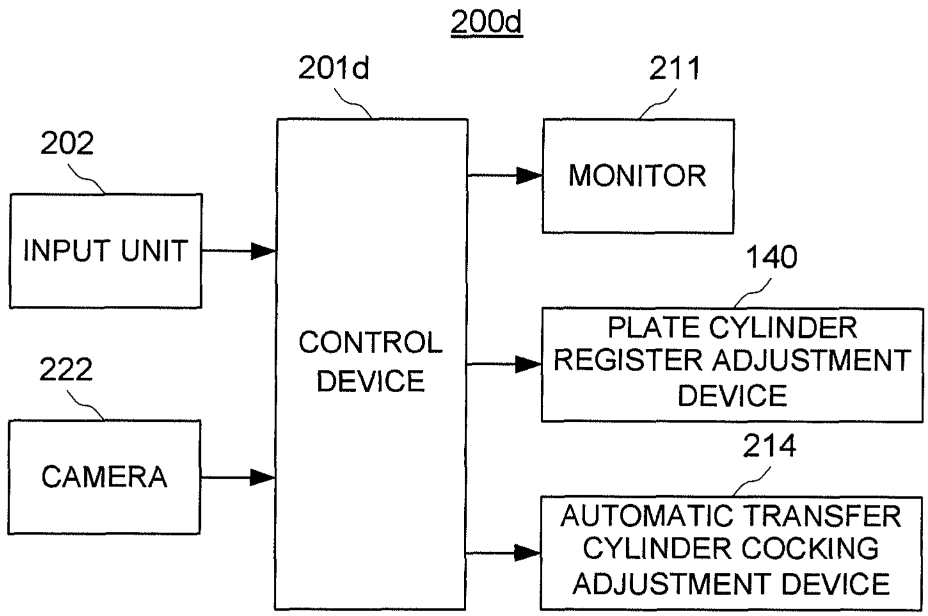

200d
201d
211
202
INPUT UNIT
MONITOR
140
CONTROL DEVICE
PLATE CYLINDER REGISTER ADJUSTMENT DEVICE
222
CAMERA
214
AUTOMATIC TRANSFER CYLINDER COCKING ADJUSTMENT DEVICE

Fig. 44

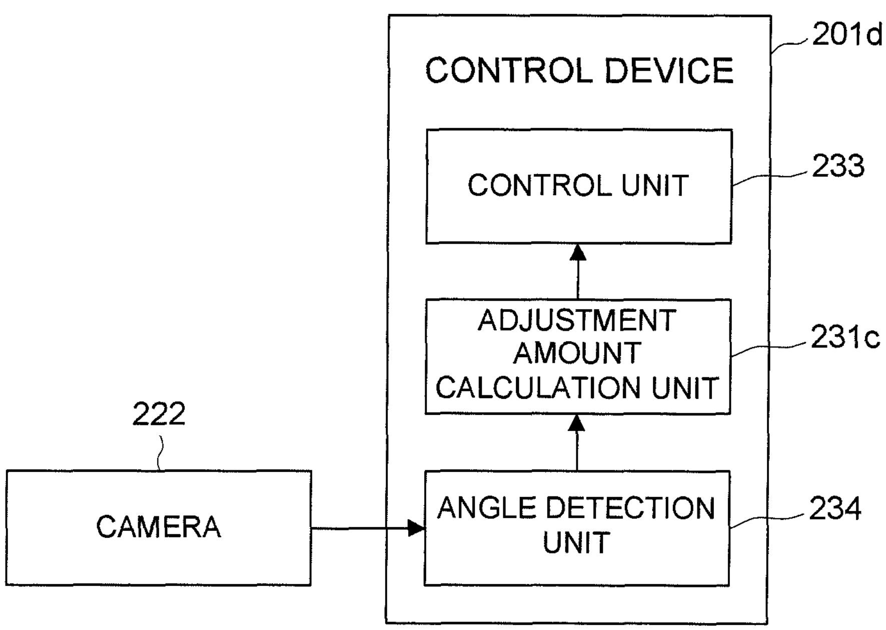

CONTROL DEVICE
201d
CONTROL UNIT
233
ADJUSTMENT AMOUNT CALCULATION UNIT
231c
222
CAMERA
ANGLE DETECTION UNIT
234

Fig. 45A

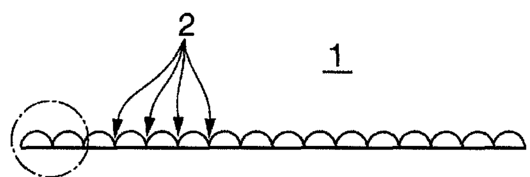
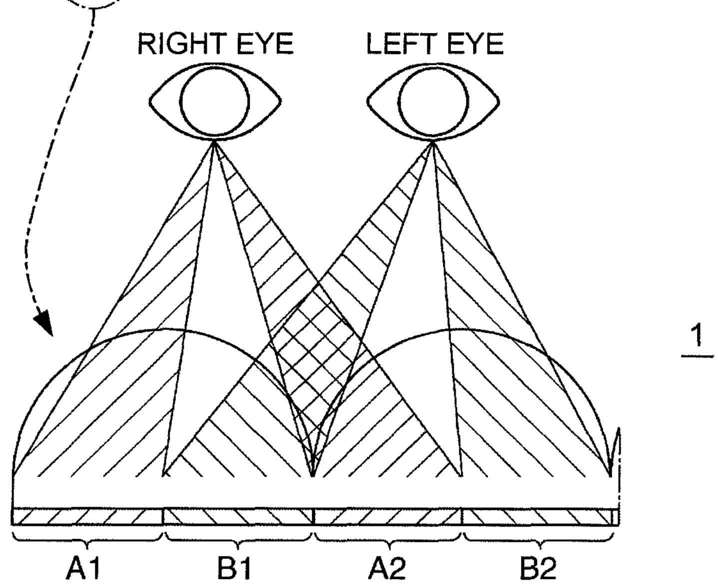


Fig. 45B



PRINTING PRESS AND PRINTING METHOD OF LENTICULAR LENS SHEET

BACKGROUND OF THE INVENTION

The present invention relates to a printing press for performing printing on a lenticular lens sheet and a printing method.

As shown in FIG. **45**A, a lenticular lens sheet **1** is formed by arranging a plurality of long lenses each having a semicircular section in stripes at a pitch of 0.1 mm to 0.7 mm. As shown in FIG. **45**B, pairs of pattern portions A**1**/B**1**, A**2**/B**2**, . . . , for right and left eyes are printed on the reverse surface of the lenticular lens sheet **1** at an interval of ½ the lens width. An observer views different images with depth on one lenticular lens sheet **1** in accordance with his/her observation direction. This realizes stereopsis by so-called optical illusion.

There are not only the above-described lenticules having a pattern printed on the lenticular lens sheet **1** to provide a view of a stereoscopic image but also lenticules that combine a plurality of totally different patterns to change the image depending on the viewing angle and lenticules that combine a plurality of gradually changing patterns to produce a moving image.

Such an effect of lenticules can be obtained by accurately positioning the lenticular lens sheet **1** formed by arranging a number of long lenses at a specific pitch and a pattern formed by arranging a number of long patterns at a specific pitch. Even in a very small amount, a positional shift between them makes it impossible to obtain the effect. For this reason, alignment between the lenticular lens sheet **1** and the pattern to be printed is very important.

Japanese Patent Laid-Open No. 2007-152818 (literature 1) proposes, as a register adjustment device of a printing press for performing printing on the lenticular lens sheet **1**, a device that adjusts the position of a plate with respect to the lenticular lens sheet **1** using a register adjustment mechanism. In the technique of literature 1, when the operator inputs a misregistration amount to the control console, the register adjustment mechanisms of all printing units operate based on the misregistration amount and perform register adjustment of the plate cylinders.

In the technique of literature 1, however, the operator needs to visually confirm the misregistration amount of the printed lenticular lens sheet **1**, determine the actual register adjustment amount based on the misregistration amount, and perform printing again after that. For this reason, a lot of rejected sheets are produced. As a result, the advantages of directly printing the pattern on the lenticular lens sheet **1**, lead time shortening and large cost reduction, are lost.

SUMMARY OF THE INVENTION

The present invention has been made to solve the above-described problem, and has as its object to propose a printing press and a printing method of a lenticular lens sheet which can accurately print a pattern on a lenticular lens sheet while reducing the number of rejected sheets.

In order to achieve the above-mentioned object, according to an aspect of the present invention, there is provided a printing press of a lenticular lens sheet, comprising a cocking adjustment unit that adjusts a relative angle between a plate on which a pattern formed from a plurality of pattern portions is formed such that boundary lines between the adjacent pattern portions become parallel and the lenticular lens sheet on which a plurality of lenses are formed such that groove

lines between the adjacent lenses become parallel and which is transparent, and an adjustment amount calculation unit that calculates an adjustment amount for the cocking adjustment unit based on a relationship between the boundary lines and the groove lines in a state in which the lenticular lens sheet is overlaid on the plate.

According to another aspect of the present invention, there is provided a printing method of a lenticular lens sheet, comprising the steps of positioning a plate and the lenticular lens sheet by overlaying the lenticular lens sheet on which a plurality of lenses are formed such that groove lines between the adjacent lenses become parallel and which is transparent, on the plate on which a pattern formed from a plurality of pattern portions is formed such that boundary lines between the adjacent pattern portions become parallel; and calculating, by an adjustment amount calculation unit based on a relationship between the boundary lines and the groove lines in a state in which the lenticular lens sheet is overlaid on the plate, an adjustment amount for a cocking adjustment unit that adjusts a relative angle between the plate an the lenticular lens sheet.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side view showing the arrangement of a four-color sheet-fed web offset printing press;

FIG. **2** is a front view showing the arrangement of the drive-side end of a plate cylinder in a plate cylinder register adjustment device;

FIG. **3** is a front view showing the arrangement of the operation-side end of the plate cylinder in the plate cylinder register adjustment device;

FIG. **4** is a side view observed in the direction of an arrow IV in FIG. **2**;

FIG. **5** is a side view observed in the direction of an arrow V in FIG. **3**;

FIG. **6** is a side view showing the arrangement of a manual transfer cylinder cocking adjustment device;

FIG. **7** is an exploded plan view showing the arrangement of the manual transfer cylinder cocking adjustment device;

FIG. **8** is a plan view showing the arrangement of a control console;

FIG. **9** is a block diagram showing the circuit arrangement of the control console that performs a manual transfer cylinder cocking adjustment operation in the first embodiment;

FIG. **10** is a block diagram showing the arrangement of a control device in FIG. **9**;

FIG. **11** is a plan view showing the arrangement of a plate;

FIG. **12** is a plan view showing the arrangement of a plate provided with register marks and a pattern;

FIGS. **13**A and **13**B are plan views showing examples of the arrangement of a lenticular lens sheet;

FIG. **14** is a plan view showing a state in which the plate is fixed on the upper surface of a table;

FIGS. **15**A and **15**B are plan views for explaining alignment between the pattern of the plate and the pattern transfer region of the lenticular lens sheet;

FIG. **16** is a plan view for explaining reading the distance (gap amount) of the lenticular lens sheet with respect to the reference position of the plate;

FIGS. **17**A to **17**C are plan views for explaining a cocking adjustment amount calculation method;

FIGS. **18**A to **18**C are plan views for explaining a transfer cylinder cocking adjustment;

FIG. **19** is a flowchart showing the procedure of the cocking adjustment operation of the transfer cylinder;

FIG. **20** is a plan view for explaining reading the distance (gap amount) of the lenticular lens sheet of the second lot with respect to the reference position of the plate;

FIG. **21** is a plan view showing the arrangement of a jig plate;

FIG. **22** is a block diagram showing the circuit arrangement of a control console that performs a manual transfer cylinder cocking adjustment operation in the description of the first modification of the first embodiment;

FIG. **23** is a block diagram showing the arrangement of a control device in FIG. **22**;

FIG. **24** is a side view showing the arrangement of an automatic transfer cylinder cocking adjustment device;

FIG. **25** is a block diagram showing the circuit arrangement of a control console that performs an automatic transfer cylinder cocking adjustment operation in the second modification of the first embodiment;

FIG. **26** is a block diagram showing the arrangement of a control device in FIG. **25**;

FIG. **27** is a side view showing the arrangement of a plate cylinder register adjustment device according to the second embodiment;

FIG. **28** is a block diagram showing the circuit arrangement of a control console that performs a manual plate cylinder cocking adjustment operation in the second embodiment;

FIG. **29** is a block diagram showing the circuit arrangement of a control console that performs a manual plate cylinder cocking adjustment operation in the description of another embodiment corresponding to the second embodiment;

FIG. **30** is a plan view for explaining plate cylinder cocking adjustment;

FIG. **31** is a block diagram showing the circuit arrangement of a control console that performs an automatic plate cylinder cocking adjustment operation in the description of a modification of the second embodiment;

FIG. **32** is a side view showing the arrangement of a front lay cocking adjustment device according to the third embodiment;

FIG. **33** is a plan view showing a state in which a front lay has undergone skewing adjustment;

FIG. **34** is a sectional view showing the arrangement of the front lay cocking adjustment device;

FIG. **35** is a block diagram showing the circuit arrangement of a control console that performs a manual front lay cocking adjustment operation in the third embodiment;

FIG. **36** is a block diagram showing the circuit arrangement of a control console that performs a manual front lay cocking adjustment operation in another embodiment corresponding to the third embodiment;

FIG. **37** is a block diagram showing the circuit arrangement of a control console that performs an automatic front lay cocking adjustment operation in the description of a modification of the third embodiment;

FIG. **38** is a side view showing the arrangement of a four-color sheet-fed web offset printing press according to the fourth embodiment;

FIG. **39** is a block diagram showing the circuit arrangement of a control console that performs a manual transfer cylinder cocking adjustment operation in the fourth embodiment;

FIG. **40** is a block diagram showing the arrangement of a control device in FIG. **39**;

FIGS. **41**A and **41**B are plan views showing a state in which the boundary lines of the pattern of a plate crosses the groove lines of a lenticular lens sheet;

FIG. **42** is a flowchart showing the procedure of the cocking adjustment operation of the transfer cylinder;

FIG. **43** is a block diagram showing the circuit arrangement of a control console that performs a manual transfer cylinder cocking adjustment operation in the description of a modification of the fourth embodiment;

FIG. **44** is a block diagram showing the arrangement of a control device in FIG. **43**;

FIG. **45**A is a sectional view showing the arrangement of a lenticular lens sheet; and

FIG. **45**B is a view for explaining the principle of the lenticular lens sheet.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The embodiments of the present invention will now be described with reference to the accompanying drawings.

<First Embodiment>

<Arrangement of Four-Color Sheet-Fed Web Offset Printing Press>

As shown in FIG. **1**, a four-color sheet-fed web offset printing press **100** that is a printing press includes a sheet supply device **101**, a printing unit **102** including printing units **102***a* to **102***d* of four colors, a sheet delivery device **103**, and a control console **200**.

The sheet supply device **101** includes a suction device **101***b* that sucks and conveys one lenticular lens sheet **1** at the top of a bundle of lenticular lens sheets **1** placed on a stack board **101***a*, and a feeder board FB that conveys the lenticular lens sheet **1** conveyed from the suction device **101***b* to the printing unit **102**. A front lay **101***c* that aligns the circumferential position of one end (leading-side end) of the lenticular lens sheet **1** is provided on the distal end side of the feeder board FB.

The printing units **102***a* to **102***d* of four colors include plate cylinders **110***a* to **110***d*, blanket cylinders (transfer cylinders) **111***a* to **111***d*, and impression cylinders (transport cylinders) **112***a* to **112***d*, respectively, The plate cylinders **110***a* to **110***d* are supported to rotatable with respect to the frame. The blanket cylinders **111***a* to **111***d* are supported to rotatable with respect to the frame, and have the outer surfaces in contact with the plate cylinders **110***a* to **110***d*, respectively. The impression cylinders **112***a* to **112***d* are supported to rotatable with respect to the frame, and have the outer surfaces in contact with the blanket cylinders **111***a* to **111***d*, respectively.

Notches (not shown) facing each other are formed in the outer surfaces of the plate cylinders **110***a* to **110***d* and those of the blanket cylinders **111***a* to **111***d*. A plate clamp configured to mount a plate is provided in the notch of each of the plate cylinders **110***a* to **110***d*. A blanket holding device that holds a blanket is provided in the notch of each of the blanket cylinders **111***a* to **111***d*.

Notches (not shown) facing those of the blanket cylinders **111***a* to **111***d* are formed in the outer surfaces of the impression cylinders **112***a* to **112***d*. A gripper device (not shown) configured to receive and convey the lenticular lens sheet **1** is provided in each of the notches.

A transfer cylinder **114** supported to be rotatable with respect to the frame is arranged in contact with the impression cylinder **112***a*. A swing arm shaft pregripper (not shown) is provided between the feeder board FB and the transfer cylinder **114**. The swing arm shaft pregripper is supported by the frame to be swingable between the transfer cylinder **114** and the distal end side of the feeder board FB. The swing arm shaft pregripper is provided with grippers that receive and hold the leading-side end of the lenticular lens sheet **1**.

A transfer cylinder **115** is disposed between the impression cylinder **112***a* and the impression cylinder **112***b* while being in contact with both of them. A transfer cylinder **116** is disposed between the impression cylinder **112***b* and the impression cylinder **112***c* while being in contact with both of them. A transfer cylinder **117** is disposed between the impression cylinder **112***c* and the impression cylinder **112***d* while being in contact with both of them. A transfer cylinder **118** in contact with the impression cylinder **112***d* is disposed on its downstream side in the sheet conveyance direction. The transfer cylinders **115** to **118** are supported to be rotatable with respect to the frame. Notches (not shown) facing those of the impression cylinders **112***a* to **112***d* are formed in the outer surfaces of the transfer cylinders **115** to **118** as well. A gripper device (not shown) configured to receive and convey the lenticular lens sheet **1** is provided in each of the notches.

The sheet delivery device **103** near the transfer cylinder **118** is provided with a stack board **103***a* for delivery on which the lenticular lens sheet **1** conveyed by a delivery chain (not shown) and a gripper bar included in the sheet delivery device **103** is stacked.

<Arrangement of Plate Cylinder>

All the plate cylinders **110***a* to **110***d* in the printing units **102***a* to **102***d* have the same arrangement. Hence, only the plate cylinder **110***a* will be described here.

As shown in FIGS. **2** and **3**, the plate cylinder **110***a* includes end shafts **110**Rb and **110**Lb at the right and left side ends. The end shafts **110**Rb and **110**Lb are rotatably supported by a drive-side frame **141** and an operation-side frame **165**, respectively. A plate cylinder register adjustment device **140** that adjusts the register of the plate cylinder **110***a* is provided outside the drive-side frame **141** and the operation-side frame **165** of the plate cylinder **110***a*.

The arrangement of the plate cylinder register adjustment device **140** will be described next with reference to FIGS. **2** to **5**. Each of the plate cylinders **110***a* to **110***d* is provided with the plate cylinder register adjustment device **140**. Since all the plate cylinder register adjustment devices **140** have the same structure, the plate cylinder register adjustment device **140** provided on the plate cylinder **110***a* will be described here.

As shown in FIG. **2**, in the plate cylinder register adjustment device **140**, an outer metal **142** is axially supported by the drive-side frame **141**. The end shaft **110**Rb of the plate cylinder **110***a* is axially supported by the outer metal **142** via an inner metal **143**. A plate **10***a* as shown in FIG. **11** is attached to the outer surface of the plate cylinder **110***a*. The axis of the outer circumference of the outer metal **142** and that of the inner metal **143** and the plate cylinder **110***a* have an eccentric amount t**1**. An external gear **144** is fixed by bolts **145** to the end face of the end shaft **110**Rb projecting outward from the drive-side frame **141**. The external gear **144** meshes with an internal gear **146** to be described later.

A bracket **147** parallel to the drive-side frame **141** is provided outside the drive-side frame **141**. The drive-side frame **141** and the bracket **147** are connected by a plurality of stays **148**. A stepped worm wheel **149** is inserted in the bearing hole of the bracket **147** and tightened and fixed to the bracket **147** by a nut **150** threadably engaging with the distal-end threaded portion of the worm wheel **149**. Thrust bearings **151** and **152** are arranged on both sides of the bracket **147**.

A threaded portion **153***a* of a flanged screw shaft **153** threadably engages with an internal threaded hole **149***a* of the worm wheel **149**. A screw plate **155** fixed to the worm wheel **149** by long holes and bolts **154** threadably engages with the distal end of the threaded portion **153***a*.

A circular plate **157** is screwed into one open end of a cylindrical coupling **156** having the internal gear **146** on the inner surface. One end of the screw shaft **153** is fitted in the hole of the circular plate **157** and fixed by the flange and a nut **158**. The flange, the nut **158**, and the circular plate **157** sandwich thrust bearings **159** and **160**. This arrangement allows the screw shaft **153** and the coupling **156** to pivot with respect to each other, and regulates their movement in the axial direction.

A helical gear **161** is fixed to a flange portion **156***a* of the coupling **156** by a ring **162** and a bolt **163**. The helical gear **161** threadably engages with a helical gear **164** on the drive side. Rotation on the drive side is transmitted to the plate cylinder **110***a* via the helical gears **164** and **161**, the internal gear **146**, and the external gear **144**. In this case, since the external gear **144** and the internal gear **146** threadably slidably engage with each other, the coupling **156** can move in the axial direction without any problem.

As shown in FIG. **3**, an outer metal **166** is axially supported by the operation-side frame **165** so as to pivot. An inner metal **167** is formed into a stepped shape by a hollow bracket portion **167***a* and a bearing portion **167***b* having a diameter smaller than that of the bracket portion **167***a*. The bearing portion **167***b* of the inner metal **167** is fitted in the outer metal **166** so as to pivot. The end shaft **110**Lb of the plate cylinder **110***a* is rotatably supported by the hole of the bearing portion **167***b*.

The axis of the outer circumference of the outer metal **166** and that of the plate cylinder **110***a* have an eccentric amount t**2** in FIG. **3**. The axis of the outer circumference of the inner metal **167** and that of the plate cylinder **110***a* have an eccentric amount t**3**. The eccentric amounts t**1** and t**2** are necessary to adjust the printing pressure of the plate cylinder **110***a* on the blanket cylinder **111***a*.

Outside the operation-side frame **165**, a vertical member **168***a* of a bracket **168** having an L shape when viewed from the front is fixed on the side of the operation-side frame **165** in parallel to it. A stepped worm wheel **169** is inserted in a bearing hole **168***b* of the vertical member **168***a* and tightened and fixed by a nut **170** threadably engaging with the distal-end threaded portion of the worm wheel **169**. Thrust bearings **171** and **172** are arranged on both sides of the bracket **168**.

A threaded portion **173***a* of a screw shaft **173** threadably engages with an internal threaded hole **169***a* of the worm wheel **169**. A screw plate **275** fixed to the worm wheel **169** by long holes and bolts **274** threadably engages with the distal end of the threaded portion **173***a*.

A flange **169***b* of the screw shaft **173** is engageably inserted in the hollow portion of the bracket portion **167***a* via a thrust bearing **174**. The screw shaft **173** and the bracket portion **167***a* are tightened and fixed by a nut **176** threadably engaging with the threaded portion via a thrust bearing **175**.

This arrangement allows the screw shaft **173** and the bracket portion **167***a* to pivot with respect to each other, and regulates their movement in the axial direction. A whirl-stop **177** is supported by the bracket **168** via a bearing box **178** to be described later. To regulate the pivot of the screw shaft **173**, the upper flat surface of the whirl-stop **177** abuts against a distal end **173***b* of the screw shaft **173**.

As shown in FIGS. **2** and **4**, a bearing box **188** formed into a box shape open upward is fixed to the bracket **147** on the drive side. A worm shaft **189** is axially supported by the bearing box **188**. A worm **190** meshing with the above-described worm wheel **149** is axially supported by the worm shaft **189**. In addition, the worm shaft **189** is connected to the motor shaft of a circumferential adjustment motor (not shown) serving as an actuator for plate cylinder register adjustment. Note that in the plate cylinder register adjustment device **140**, the worm shaft **189**, the worm wheel **149**, the screw shaft **153**, the coupling **156**, and the helical gear **161** constitute a circumferential position adjustment mechanism that adjusts the circumferential register with respect to the lenticular lens sheet **1**.

On the other hand, as shown in FIGS. **3** and **5**, a lateral adjustment motor **193** serving as an actuator for plate cylinder register adjustment is fixed to the bearing box **178**. A worm shaft **194** is connected to the motor shaft of the lateral adjustment motor **193**. A worm **195** meshing with the worm wheel **169** is integrally formed on the worm shaft **194**. Note that in the plate cylinder register adjustment device **140**, the lateral adjustment motor **193**, the worm wheel **169**, the screw shaft **173**, and the bracket portion **167***a* constitute a lateral position adjustment mechanism that adjusts the lateral register with respect to the lenticular lens sheet **1**.

<Arrangement of Transfer Cylinder>

The arrangement of the transfer cylinder **114** will be described next. As shown in FIGS. **6** and **7**, the transfer cylinder **114** is the first transfer cylinder existing immediately after the feeder board FB and the swing arm shaft pregripper. A manual transfer cylinder cocking adjustment device **213** serving as a cocking adjustment unit that performs cocking adjustment for the transfer cylinder **114** is provided.

One end shaft **330** of the transfer cylinder **114** is supported to be rotatable with respect to a bearing **332** fitted in the bearing hole of the drive-side frame **141**. A plate cylinder drive gear **333** connected to the drive side is axially supported by the end shaft **330**. The other end shaft **334** of the transfer cylinder **114** is supported to be rotatable with respect to an eccentric bearing **336** fitted in a bearing hole **335***a* of the operation-side frame **165**. An axis A of a frame-side outer circumference **336***a* fitted in the bearing hole **335***a* of the eccentric bearing **336** and an axis B of an end shaft-side internal circumference **336***b* have an eccentric amount t**4**.

On the other hand, a handle **337** with a dial **337***a* is supported at the end of the operation-side frame **165** on the side of the sheet delivery device **103** by a stud **338** embedded in the operation-side frame **165** so as to pivot. A lever **339** is pivotally attached to n the operation-side frame **165** by a pin **340** to be swingable.

The distal-end threaded portion of the handle **337** threadably engages with the threaded hole of a piece **341** attached to the swing end-side forked portion of the lever **339** to be movable. In addition, one end of a rod **342** is pivotally attached to the swing end-side forked portion of the lever **339**, and the other end of the rod **342** is pivotally attached to a forked portion **336***c* formed on the flange portion of the eccentric bearing **336**.

The handle **337** is used as an operation unit that causes the eccentric bearing **336** to pivot. Note that although FIG. **7** divisionally illustrates the forked portion to which the piece **341** is pivotally attached and the forked portion to which one end of the rod **342** is pivotally attached on the upper and lower sides because it is an exploded view, they are pivotally attached to the same forked portion in practice. The handle **337**, the lever **339**, the rod **342**, and the eccentric bearing **336** constitute the manual transfer cylinder cocking adjustment device **213**. The manual transfer cylinder cocking adjustment device **213** also functions as a sheet skewing device (cocking adjustment unit) that adjusts the angle of the lenticular lens sheet **1** with respect to the plate **10***a*.

<Arrangement of Control Console>

The arrangement of the control console **200** in the four-color sheet-fed web offset printing press **100** will be described next. As shown in FIGS. **1** and **8**, the control console **200** includes a table **20**. The plate **10***a* as shown in FIGS. **11** and **12** and the lenticular lens sheet **1** as shown in FIGS. **13**A and **13**B are placed on the upper surface of the table **20**.

A frame **20***a* is provided at an end of the table **20**. A stopper (first reference member) **21** projecting from the frame **20***a* and having a rectangular distal end and a stopper (second reference member) **22** having a semicircular distal end are disposed on the upper surface of the table **20** while being spaced apart from each other. Although FIG. **8** illustrates an example in which the stoppers **21** and **22** are arranged on one edge of the table **20**, the arrangement of the stoppers **21** and **22** is not limited to this. In addition, a scale **23** indicating the distance from the semicircular from the semicircular distal end of the stopper **22** is provided on the upper surface of the table **20** on the distal end side of the stopper **22**. The "distance" means the distance in a direction perpendicular to the one edge of the table **20** or the frame **20***a*.

The table **20** incorporates a control device **201** having a microcomputer configuration including a CPU (Central Processing Unit) as shown in FIG. **9**. An input unit **202** formed from a keyboard and the like to accept an input from the operator is connected to the control device **201**. A monitor **211** serving as a display unit and the above-described plate cylinder register adjustment device **140** are also connected to the control device **201**. However, the manual transfer cylinder cocking adjustment device **213** of the transfer cylinder **114** is not connected to the control device **201**.

As shown in FIG. **10**, the control device **201** includes an adjustment amount calculation unit **231** that calculates a cocking adjustment amount for the manual transfer cylinder cocking adjustment device (cocking adjustment unit) **213** based on the relationship between the boundary lines **14** of the pattern **13** of the plate **10***a* and the groove lines **2** of the lenticular lens sheet **1** in a state in which the lenticular lens sheet **1** (FIG. **18**B) is overlaid on the plate **10***a* (FIG. **18**A). Details of the adjustment amount calculation unit **231** will be described later.

<Arrangement of Plate Mounted on Plate Cylinder>

Plates **10***a* to **10***d* are mounted on the plate cylinders **110***a* to **110***d*, respectively. All the plates **10***a* to **10***d* have the same arrangement. Hence, only the arrangement of the plate **10***a* mounted on the plate cylinder **110***a* will be described here.

As shown in FIG. **11**, the plate **10***a* mounted on the plate cylinder **110***a* is rectangular as a whole. A rectangular notch (first reference pin hole) **11** and a U-shaped notch (second reference pin hole) **12** are formed on one side (lower edge **19** in FIG. **11**) of the plate **10***a* while being spaced apart from each other. The rectangular notch **11** and the U-shaped notch **12** serve as references when attaching the plate **10***a* to the plate cylinder **110***a*. The rectangular notch **11** and the U-shaped notch **12** have the same shapes as those of distal ends of the stoppers **21** and **22**, respectively. In addition, the interval between the rectangular notch **11** and the U-shaped notch **12** is the same as that between the stoppers **21** and **22**.

A pattern **13** made using the rectangular notch **11** and the U-shaped notch **12** as the references is formed on the plate **10***a*. The pattern **13** is formed from a plurality of long pattern portions A**1**, B**1**, A**2**, B**2**, ... Boundary lines **14** between the pattern portions adjacent each other are parallel.

As shown in FIG. **45**B, the pattern portions A**1** and B**1** form one combined pattern portion. A plurality of pattern portions form the pattern **13**. The width (A**1**+B**1**) of one combined pattern portion equals the width of one lens of the lenticular lens sheet **1**, that is, the distance between groove lines **2** indicated by broken lines in FIGS. **13**A and **13**B.

Because of the reasons of the plate maker, the plate **10***a* is normally made such that the lower right corner of the pattern **13** is raised upward by a distance t with respect to a virtual horizontal line L**1** parallel to the lower edge **19** on which the rectangular notch **11** and the U-shaped notch **12** are formed.

However, the plate **10***a* may be made such that the pattern **13** becomes parallel to the virtual horizontal line L**1**.

As shown in FIG. **12**, cross-shaped register marks **15** and **16** are formed on the left and right sides of the pattern **13** of the plate **10***a*. The register marks **15** and **16** are formed on the plate **10***a* simultaneously as the pattern **13**. The relative positional relationship between the pattern **13** and the register marks **15** and **16** is common to all the four plates **10***a* to **10***d*.

Additionally, a scale **17** indicating the distance from the distal end of the U-shaped notch **12** is provided on the distal end side of the U-shaped notch **12** on the plate **10***a*. The "distance" means the distance in a direction perpendicular to the lower edge **19** of the plate **10***a*. As will be described later, when the plate **10***a* is placed on the table **20**, the stopper **22** of the table **20** fits in the U-shaped notch **12** of the plate **10***a*. In this state, the scale **17** indicates the distance from the distal end of the stopper **22**.

<Arrangement of Lenticular Lens Sheet>

As shown in FIGS. **13**A and **13**B, the lenticular lens sheet **1** to which the pattern **13** of the plate **10***a* is transferred is formed by arranging a plurality of long lenses each having a semicircular section in stripes at a pitch of 0.1 mm to 0.7 mm. The lenticular lens sheet **1** has an obverse surface with uneven stripes and a flat reverse surface. The lenticular lens sheet **1** is a transparent sheet. "Transparent" does not necessarily indicate "colorless and transparent". The lenticular lens sheet **1** may be color-tinted if printing on its reverse surface can visually be recognized from the obverse surface. The plurality of lenses are formed such that the groove lines **2** between the adjacent lenses become parallel. The lenticular lens sheet **1** is rectangular and has the edges (upper edge **1***a*, lower edge **1***b*, left edge **1***c*, and right edge **1***d*) of the four sides.

The groove lines **2** of the lenticular lens sheet **1** are ideally parallel to the left edge **1***c* and the right edge **1***d*. In practice, however, the groove lines **2** are not necessarily parallel to the left edge **1***c* and the right edge **1***d*. In addition, the direction of the groove lines **2** may change between cutting lots (one lot includes about 100 sheets) (FIGS. **13**A and **13**B).

<Adjustment Operation of Four-Color Sheet-Fed Web Offset Printing Press>

Before the start of printing by the four-color sheet-fed web offset printing press **100**, if a misregistration in the circumferential direction or lateral direction exists between the lenticular lens sheet **1** and the pattern **13** of the plate **10***a* mounted on plate cylinder **110***a*, a circumferential or lateral register adjustment operation is performed in advance. In addition, to make the plurality of boundary lines **14** of the pattern **13** of the plate **10***a* match the plurality of groove lines **2** of the lenticular lens sheet **1**, the cocking adjustment operation by the transfer cylinder **114** is performed in advance.

<Plate Cylinder Register Adjustment Operation>

A circumferential register adjustment operation for the plate cylinder **110***a* which is performed when a misregistration in the circumferential direction exists between the lenticular lens sheet **1** and the pattern **13** of the plate **10***a* mounted on the plate cylinder **110***a* and a lateral register adjustment operation for the plate cylinder **110***a* which is performed when a misregistration in the lateral direction (the axial direction of the plate cylinder **110***a*) exists between the lenticular lens sheet **1** and the pattern **13** of the plate **10***a* mounted on the plate cylinder **110***a* will be described.

The circumferential register adjustment operation and the lateral register adjustment operation for the plate cylinder **110***a* of the first color are performed in a state in which the printing operation of the four-color sheet-fed web offset printing press **100** is stopped. The circumferential register adjustment operation and the lateral register adjustment operation for the plate cylinder **110***b* of the second color, the plate cylinder **110***c* of the third color, and the plate cylinder **110***d* of the fourth color are sequentially executed after the register adjustment operation of the plate **10***a* mounted on the plate cylinder **110***a* of the first color. With these operations, all the circumferential and lateral positions of the plate **10***a* mounted on the plate cylinder **110***a* of the first color to the plate **10***d* mounted on the plate cylinder **110***d* of the fourth color are aligned.

Under the control of the control device **201**, a circumferential adjustment motor (not shown) is driven, and the worm shaft **189** of the circumferential position adjustment mechanism in the plate cylinder register adjustment device **140** shown in FIGS. **2** and **4** pivots. Then, the screw shaft **153** rotates via the worm **190** and the worm wheel **149** and moves in the axial direction by the screw function of the threaded portion **153***a*. The coupling **156** and the helical gear **161** integrated with the screw shaft **153** in the axial direction also move in the axial direction, and the plate cylinder **110***a* slightly rotates in the circumferential direction by the helical gear function of the helical gears **161** and **164**. The circumferential register adjustment for the plate cylinder **110***a* is thus performed.

That is, when the plate cylinder **110***a* rotates in the circumferential direction, the plate **10***a* mounted on it also rotates in the circumferential direction together with the plate cylinder **110***a*. This eliminates the misregistration in the circumferential direction between the lenticular lens sheet **1** and the pattern **13** of the plate **10***a* mounted on the plate cylinder **110***a*.

The circumferential register adjustment for the plate cylinder **110***a* is performed to transfer the pattern **13** of the first color to the lenticular lens sheet **1**. The circumferential register adjustment is similarly performed for the plate cylinders **110***b*, **110***c*, and **110***d* based on the circumferential register adjustment amount at this time.

As shown in FIGS. **3** and **5**, under the control of the control device **201**, the lateral adjustment motor **193** is driven, and the worm shaft **194** of the lateral position adjustment mechanism in the plate cylinder register adjustment device **140** rotates. Then, the screw shaft **173** moves in the axial direction by the screw function of the threaded portion **173***a*. The integrated plate cylinder **110***a* moves in the axial direction via the screw shaft **173** and the bracket portion **167***a*. The lateral register adjustment for the plate cylinder **110***a* is thus performed.

That is, when the plate cylinder **110***a* moves in the axial direction, the plate **10***a* mounted on it also moves in the axial direction together with the plate cylinder **110***a*. This eliminates the misregistration in the lateral direction between the lenticular lens sheet **1** and the pattern **13** of the plate **10***a* mounted on the plate cylinder **110***a*.

The lateral register adjustment for the plate cylinder **110***a* is performed to transfer the pattern **13** of the first color to the lenticular lens sheet **1**. The lateral register adjustment is similarly performed for the plate cylinders **110***b*, **110***c*, and **110***d* based on the lateral register adjustment amount at this time.

<Manual Transfer Cylinder Cocking Adjustment Operation>

As described above, when the circumferential and lateral register adjustment operations of the plates **10***b* to **10***d* of the remaining three colors have ended based on the circumferential and lateral register adjustment operations of the plate **10***a* of the first color, the misregistrations in the circumferential and lateral directions are eliminated in all of the plate **10***a* of the first color to the plate **10***d* of the fourth color.

In the lenticular lens sheet **1**, however, the groove lines **2** between the lenses are not necessarily parallel to the left edge **1***c* and the right edge **1***d*, as shown in FIGS. **13**A and **13**B. For this reason, even if the plate **10**a and the lenticular lens sheet **1** are overlaid such that the frame around the pattern **13** formed on the plate **10**a matches the edges (upper edge **1**a, lower edge **1**b, left edge **1**c, and right edge **1**d) of the lenticular lens sheet **1**, the boundary lines **14** between the pattern portions A**1**, B**1**, A**2**, B**2**, . . . of the pattern **13** do not angularly match the groove lines **2** between the lenses of the lenticular lens sheet **1**, resulting in a shift. It is therefore necessary to obtain a cocking adjustment amount hp (to be described later) used by the operator to perform transfer cylinder cocking adjustment by manually operating the manual transfer cylinder cocking adjustment device **213** of the transfer cylinder **114** to make the plurality of boundary lines **14** of the pattern **13** of the plate **10**a on the plate cylinder **110** match the plurality of groove lines **2** of the lenticular lens sheet **1**. The cocking adjustment amount hp is obtained in accordance with the following procedure.

First, the operator places the plate **10**a of the first color to be mounted on the plate cylinder **110**a on the upper surface of the table **20** of the control console **200** in the four-color sheet-fed web offset printing press **100**. At this time, the rectangular notch **11** and the U-shaped notch **12** formed in the lower edge **19** of the plate **10**a are fitted on the two stoppers **21** and **22** projecting from the frame **20**a of the table **20** so as to abut against them, as shown in FIG. **14**. The plate **10**a is thus positioned on the table **20**. Plate positioning step S**1** (FIG. **19**) of the plate **10**a is performed in this way.

As shown in FIG. **15**A, the operator places the lenticular lens sheet **1** on the plate **10**a positioned on the table **20** and abuts the lower edge **1**b of the lenticular lens sheet **1** against the stoppers **21** and **22** of the table **20**. At this time, the lenticular lens sheet **1** is placed such that the left end of the lower edge **1**b of the lenticular lens sheet **1** projects to the outside of the stopper **21** (the opposite side of the stopper **22** viewed from the stopper **21**). Since the lenticular lens sheet **1** is formed from a transparent member, the operator can visually observe, through the lenticular lens sheet **1**, the relationship between the boundary lines **14** between the plurality of pattern portions of the pattern **13** of the plate **10**a and the groove lines **2** between the plurality of lenses of the lenticular lens sheet **1**.

As shown in FIG. **15**B, the operator rotates the lenticular lens sheet **1** to separate the right end side of the lower edge **1**b of the lenticular lens sheet **1** from the stopper **22** while keeping the left end side of the lower edge **1**b of the lenticular lens sheet **1** in contact with the stopper **21**. The boundary lines **14** of the plate **10**a match the groove lines **2** of the lenticular lens sheet **1** at a certain angle.

For example, the operator brings the lenticular lens sheet **1** into contact with the stopper **21**, and in this state, rotates the lenticular lens sheet **1** using the point of contact as the rotation center to make the groove lines **2** of the lenticular lens sheet **1** parallel to the boundary lines **14** of the plate **10**a. Let θ be the rotation angle at this time. If the groove lines **2** of the lenticular lens sheet **1** do not match the boundary lines **14** of the plate **10**a, the operator moves the lenticular lens sheet **1** in its longitudinal direction while maintaining the angle θ in the state in which the lenticular lens sheet **1** is in contact with the stopper **21**, thereby making the groove lines **2** match the boundary lines **14**. If the groove lines **2** match the boundary lines **14**, the groove lines **2** are parallel to the boundary lines **14**. It is therefore possible to easily confirm that the groove lines **2** are parallel to the boundary lines **14** by making the groove lines **2** match the boundary lines **14**. Note that if it can be confirmed that the groove lines **2** are parallel to the boundary lines **14**, the groove lines **2** need not always be made to match the boundary lines **14**.

The lenticular lens sheet **1** is thus accurately aligned with the pattern **13** of the plate **10**a. Lenticular lens sheet aligning step S**2** (FIG. **19**) of the lenticular lens sheet **1** to the plate **10**a is performed in this way.

This makes it possible to form a state in which the pattern portions A**1**, B**1**, A**2**, B**2**, . . . of the pattern **13** of the plate **10**a are accurately aligned with the pattern transfer regions between the groove lines **2** of the lenticular lens sheet **1**, that is, a relative positional (angular) relationship capable of accurately transferring the combined pattern portions (A**1**+B**1**, A**2**+B**2**, . . .) of the pattern **13** of the plate **10**a to the pattern transfer regions between the groove lines **2** of the lenticular lens sheet **1**.

In the state in which the lenticular lens sheet **1** is aligned with the pattern **13** of the plate **10**a, the operator visually observes the scale **17** provided on the surface of the plate **10**a, thereby reading a distance (gap amount) hs from the distal end of the stopper **22** to the lower edge **1**b of the lenticular lens sheet **1**, as shown in FIG. **16**. As described above, the "distance" means the distance in a direction perpendicular to the one edge of the table **20**, the frame **20**a, or the lower edge **19** of the plate **10**a (the same will apply hereinafter). Distance measurement step S**3** (FIG. **19**) of the distance (gap amount) hs is performed in this way.

The operator inputs the distance hs from the input unit **202** of the control console **200**. The distance hs is output to the control device **201**. The adjustment amount calculation unit **231** of the control device **201** calculates the cocking adjustment amount hp of the lenticular lens sheet **1** with respect to the pattern **13** of the plate **10**a based on the distance hs.

The cocking adjustment amount hp can be calculated in the following way. As shown in FIG. **17**A, let Ls be the distance between the left end of the stopper **21** of the table **20** (that is, the portion where the stopper **21** abuts against the lower edge **1**b of the lenticular lens sheet **1**) and the distal end (central position) of the stopper **22**, and hs be the distance (gap amount) from the distal end of the stopper **22** to the lower edge **1**b of the lenticular lens sheet **1**. As shown in FIG. **17**B, let Lp be the distance between the shaft supporting portions of the transfer cylinder **114** (that is, the distance between the bearing **332** of the end shaft **330** and the bearing **336** of the end shaft **334** of the transfer cylinder **114**), and hp be the moving amount (that is, cocking adjustment amount) of one end shaft **330** of the transfer cylinder **114**. In this case, $hp=Lp\times\sin\theta$, as shown in FIG. **17**C.

On the other hand, since the relation $hs=Ls\times\tan\theta$ holds, as shown in FIG. **17**A, $\theta=\arctan(hs/Ls)$. Hence, the cocking adjustment amount hp is given by $hp=Lp\times\sin\{\arctan(hs/Ls)\}$, which is obtained by the known sizes Ls and Lp and the distance hs measured in the distance measurement step. Calculation step S**4** (FIG. **19**) of the cocking adjustment amount hp is performed in this way.

The control device **201** displays the calculated cocking adjustment amount hp on the monitor **211**. The operator can thus recognize the cocking adjustment amount hp serving as an index when manually performing cocking adjustment of the transfer cylinder **114**. Display step S**5** (FIG. **19**) of the cocking adjustment amount hp is performed in this way.

The operator operates the handle **337** based on the cocking adjustment amount hp displayed on the monitor **211** while confirming the dial **337**a of the manual transfer cylinder cocking adjustment device **213**. In accordance with the operation of the handle **337**, the lever **339** swings via the piece **341**, and the eccentric bearing **336** pivots via the rod **342** by an angle corresponding to the pivotal operation of the handle **337**. The transfer cylinder **114** thus undergoes skewing adjustment (cocking adjustment) in accordance with the pivotal movement of the eccentric bearing **336**. Transfer cylinder cocking adjustment step S**6** (FIG. **19**) is performed in this way.

Since the bearing **336** on the operation side of the transfer cylinder **114** has the eccentric amount t**4**, the shaft of the transfer cylinder **114** tilts with respect to the shaft of the impression cylinder **112***a* by the eccentric function of the bearing **336**, and skewing adjustment (cocking adjustment) is performed by the cocking adjustment amount hp. The lenticular lens sheet **1** conveyed via the transfer cylinder **114** also tilts by the cocking adjustment amount hp, and the conveyance angle of the lenticular lens sheet **1** is adjusted.

That is, when the lenticular lens sheet **1** conveyed via the feeder board FB and the swing device is transferred to the gripper device of the transfer cylinder **114**, the lenticular lens sheet **1** is held and conveyed in a state in which the conveyance angle undergoes skewing adjustment by the cocking adjustment amount hp because the manual transfer cylinder cocking adjustment device **213** has performed the skewing adjustment of the transfer cylinder **114** in advance by the cocking adjustment amount hp.

As described above, the circumferential position adjustment mechanism and the lateral position adjustment mechanism of the plate cylinder register adjustment device **140** perform the circumferential and lateral register adjustment operations of the plate cylinders **110***a* to **110***d* in advance. In addition, the manual transfer cylinder cocking adjustment device **213** performs the cocking adjustment operation of the transfer cylinder **114** in advance. Adjustment is thus performed in advance to a transfer enable state in which the plurality of boundary lines **14** of the pattern **13** of each of the plates **10***a* to **10***d* on the plate cylinders **110***a* to **110***d* of the first to fourth colors match the plurality of groove lines **2** of the lenticular lens sheet **1**.

When passing through the transfer cylinder **114** that has undergone the skewing adjustment in advance, the lenticular lens sheet **1** having the tilted groove lines **2** as shown in FIG. **18**B also undergoes skewing adjustment by itself. The lenticular lens sheet **1** that has undergone the skewing adjustment passes between the impression cylinder **112***a* and the blanket cylinder **111***a* in contact with the plate cylinder **110***a* that has undergone the circumferential and lateral register adjustments in advance. At this time, a positional relationship in which the boundary lines **14** (FIG. **18**A) of the pattern **13** of the plate **10***a* transferred via the blanket cylinder **111***a* relatively match the groove lines **2** (FIG. **18**B) of the lenticular lens sheet **1**, as shown in FIG. **18**C, is obtained. It is therefore possible to accurately transfer the combined pattern portions (A1+B1, A2+B2, . . .) of the pattern **13** of the plate **10***a* to the pattern transfer regions between the groove lines **2** of the lenticular lens sheet **1** without shifts. The adjustment operation of the four-color sheet-fed web offset printing press **100** thus ends.

Since the plate cylinder register adjustment device **140** has performed the circumferential and lateral register adjustments, and the transfer cylinder **114** has performed the skewing adjustment, the four-color sheet-fed web offset printing press **100** performs test printing on the lenticular lens sheet **1** via the printing units **102***a* to **102***d*. As a result, if shift amounts exist in the register marks **15** and **16** of the respective colors printed on the lenticular lens sheet **1** by the printing units **102***a* to **102***d*, fine circumferential or lateral register adjustment of the plate cylinders **110***a* to **110***d* or fine skewing adjustment of the transfer cylinder **114** is performed based on the shift amounts.

In this embodiment, a case has been described in which after the circumferential and lateral register adjustment operations of the plate cylinder register adjustment device **140** have ended, the manual transfer cylinder cocking adjustment device **213** performs the cocking adjustment operation of the transfer cylinder **114**. However, the present invention is not limited to this. After the cocking adjustment operation of the transfer cylinder **114** by the manual transfer cylinder cocking adjustment device **213**, the plate cylinder register adjustment device **140** may perform the circumferential and lateral register adjustment operations, or the operations may simultaneously be performed.

<Printing Operation of Four-Color Sheet-Fed Web Offset Printing Press>

In the four-color sheet-fed web offset printing press **100**, the lenticular lens sheet **1** held by the suction device **101***b* of the sheet supply device **101** is placed on the feeder board FB and conveyed. In a state in which one end (leading-side end) of the lenticular lens sheet **1** abuts against the front lay **101***c* provided on the distal end side of the feeder board FB, and the circumferential position is aligned, the lenticular lens sheet **1** is transferred from the swing arm grippers of the swing device to the gripper device of the transfer cylinder **114**.

The cocking adjustment operation of the transfer cylinder **114** is performed in advance by the manual transfer cylinder cocking adjustment device **213**. For this reason, when the lenticular lens sheet **1** is transferred from the gripper device of the transfer cylinder **114** to the gripper device of the impression cylinder **112***a* of the printing unit **102***a*, the lenticular lens sheet **1** is held and conveyed by the gripper device of the impression cylinder **112***a* in a state in which the conveyance angle of the lenticular lens sheet **1** undergoes skewing adjustment by the cocking adjustment amount hp. At this time, the lenticular lens sheet **1** is conveyed with its reverse surface facing outward.

The lenticular lens sheet **1** held by the gripper device of the impression cylinder **112***a* is conveyed as the impression cylinder **112***a* rotates, and passes between the impression cylinder **112***a* and the blanket cylinder **111***a*. At this time, the pattern **13** of the plate **10***a* of the first color mounted on the plate cylinder **110***a* is transferred to the reverse surface of the lenticular lens sheet **1** via the blanket cylinder **111***a*.

The cocking adjustment operation of the transfer cylinder **114** is performed in advance, and the circumferential and lateral register adjustment operations of the plate cylinder **110***a* are performed in advance by the circumferential position adjustment mechanism and the lateral position adjustment mechanism in the plate cylinder register adjustment device **140**. Hence, the pattern is accurately transferred in a state in which the boundary lines **14** of the pattern **13** of the plate **10***a* of the first color match the groove lines **2** of the lenticular lens sheet **1**.

The lenticular lens sheet **1** with the transferred pattern **13** of the plate **10***a* is transferred from the gripper device of the impression cylinder **112***a* to the gripper device of the transfer cylinder **115** and then conveyed from the transfer cylinder **115** to the impression cylinder **112***b* of the printing unit **102***b*.

In the printing unit **102***b*, the lenticular lens sheet **1** held by the gripper device of the impression cylinder **112***b* is conveyed as the impression cylinder **112***b* rotates, and passes between the impression cylinder **112***b* and the blanket cylinder **111***b*, as in the printing unit **102***a*. At this time, the pattern **13** of the plate **10***b* of the second color mounted on the plate cylinder **110***b* is transferred to the reverse surface of the lenticular lens sheet **1** via the blanket cylinder **111***b*.

In the printing units **102***c* and **102***d* as well, the patterns **13** of the plates **10***c* and **10***d* of the third and fourth colors are accurately transferred to the reverse surface of the lenticular lens sheet **1** via the blanket cylinders **111***c* and **111***d* in a similar manner. After that, the lenticular lens sheet **1** is conveyed to the sheet delivery device **103** via the transfer cylinder **118**.

The circumferential and lateral register adjustments are similarly performed for the plate cylinder **110***b*, **110***c*, and **110***d* based on the circumferential and lateral register adjustment amounts for the plate cylinder **110***a*. Hence, the pattern is accurately transferred in a state in which in all of the pattern **13** of the plate **10***a* of the first color to the pattern **13** of the plate **10***d* of the fourth color, the boundary lines **14** match the groove lines **2** of the lenticular lens sheet **1**.

The lenticular lens sheet **1** conveyed to the sheet delivery device **103** is conveyed via the gripper bar of the delivery chain (not shown) provided in the sheet delivery device **103** and stacked on the stack board **103***a* for delivery under the deliver chain.

As described above, when transferring the pattern **13** of the plate **10***a* to the lenticular lens sheet **1** of the second lot after the pattern **13** of the plate **10***a* has accurately been transferred to the lenticular lens sheets **1** of the first lot, the cocking adjustment amount hp calculated for the lenticular lens sheet **1** of the first lot cannot directly be used. In this case, the cocking adjustment amount hp for the lenticular lens sheet **1** of the second lot is obtained in the following way.

As shown in FIG. **20**, the operator abuts the lower edge **1***b* of the lenticular lens sheet **1** of the first lot against the stoppers **21** and **22** of the table **20**. The operator places and overlays the lenticular lens sheet **1** of the second lot on the lenticular lens sheet **1** of the first lot. The operator rotates the lenticular lens sheet **1** of the second lot to separate the right end of the lower edge **1***b* of the lenticular lens sheet **1** of the second lot from the stopper **22** while keeping the left end side of the lower edge **1***b* of the lenticular lens sheet **1** of the second lot in contact with the stopper **21** of the table **20** without moving the lenticular lens sheet **1** of the first lot. All the plurality of groove lines **2** of the lenticular lens sheet **1** of the second lot match the plurality of groove lines **2** of the lenticular lens sheet **1** of the first lot at a certain angle.

The operator reads the distance (gap amount) hs from the distal end of the stopper **22** to the lower edge **1***b* of the lenticular lens sheet **1** of the second lot by the scale **23** provided on the table **20**, and inputs the distance (gap amount) hs to the control device **201** via the input unit **202**. This makes it possible to obtain the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot by the transfer cylinder **114**.

The thus obtained cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot is the difference from the cocking adjustment amount hp of the lenticular lens sheet **1** of the first lot. Assume that the cocking adjustment amount hp obtained from the relationship between the boundary lines **14** of the pattern **13** of the plate **10***a* and the groove lines **2** of the lenticular lens sheet **1** is referred to as the "absolute cocking adjustment amount hp". In this case, the difference corresponds to the difference between the absolute cocking adjustment amount hp of the lenticular lens sheet **1** of the first lot and the absolute cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot. The value of the difference is used as the cocking adjustment amount for the lenticular lens sheet **1** of the second lot.

The cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot is also calculated in advance before the start of the printing operation of the four-color sheet-fed web offset printing press **100**. This makes it possible to shorten the printing press stop time from the end of printing of the lenticular lens sheets **1** of the first lot until the start of printing of the lenticular lens sheets **1** of the second lot as much as possible.

When printing of the lenticular lens sheets **1** of the first lot has ended, the operator operates the handle **337** based on the cocking adjustment amount hp of the second lot (the difference from the cocking adjustment amount hp of the first lot) obtained in advance while confirming the dial **337***a* of the manual transfer cylinder cocking adjustment device **213**. Since the transfer cylinder **114** undergoes skewing adjustment (cocking adjustment) in accordance with the lenticular lens sheet **1** of the second lot, the conveyance angle of the lenticular lens sheet **1** of the second lot conveyed via the transfer cylinder **114** also undergoes skewing adjustment.

<Jig Plate>

In the first embodiment, a case has been described in which the cocking adjustment amount hp is obtained using the plate **10***a* of the first color. The plates **10***a* to **10***d* of the respective colors basically have the same arrangement except the pattern **13**. The tilt of the boundary lines **14** between the pattern portions A**1**, B**1**, . . . is also the same among the plates **10***a* to **10***d*. Hence, the cocking adjustment amount hp may be obtained using the plates **10***b* to **10***d* of the second to fourth colors in place of the plate **10***a* of the first color.

The cocking adjustment amount hp can also be obtained using a jig plate **10***j* as shown in FIG. **21** in place the plates **10***a* to **10***d* actually used in printing. The jig plate **10***j* is a plate serving as a jig used for an adjustment operation without being attached to the plate cylinders **110***a* to **110***d*. The jig plate **10***j* basically has the same arrangement as the plates **10***a* to **10***d* of the respective colors except the pattern **13**. The tilt of the boundary lines **14** between the pattern portions A**1**, B**1**, . . . is also the same as in the plates **10***a* to **10***d*.

A method of obtaining the cocking adjustment amount hp for the lenticular lens sheet **1** of the first lot using the jig plate **10***j* is the same as the above-described method using the plate **10***a*.

A method of obtaining the cocking adjustment amount hp for the lenticular lens sheet **1** of the second lot using the jig plate **10***j* will be described.

The operator places the jig plate **10***j* on the upper surface of the table **20** of the control console **200**, and fits the notches **11** and **12** on the stoppers **21** and **22**, thereby positioning the jig plate **10***j*. The lenticular lens sheet **1** of the second lot is placed on the jig plate **10***j*, and the lower edge **1***b* of the lenticular lens sheet **1** is made to abut against the stoppers **21** and **22**. The operator rotates the lenticular lens sheet **1** while keeping the left end side of the lower edge **1***b* of the lenticular lens sheet **1** in contact with the stopper **21**, thereby making the plurality of groove lines **2** of the lenticular lens sheet **1** match the plurality of boundary lines **14** of the pattern **13** of the jig plate **10***j*. The operator refers to the scale **17** provided on the jig plate **10***j*, to read the distance (gap amount) hs from the distal end of the stopper **22** to the lower edge **1***b* of the lenticular lens sheet **1**, and inputs the distance hs from the input unit **202** to the control device **201**.

The adjustment amount calculation unit **231** of the control device **201** calculates the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot based on the input distance hs. This corresponds to the above-described absolute cocking adjustment amount hp. Hence, the adjustment amount calculation unit **231** calculates the difference between the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot and the cocking adjustment amount hp of the lenticular lens sheet **1** of the first lot. The control device **201** displays the difference on the monitor **211** as the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot.

The cocking adjustment amount hp of the lenticular lens sheet **1** of the first lot used here can be either a value obtained using the plate **10***a* or a value obtained using the jig plate **10***j*. The cocking adjustment amount hp of the same value can be obtained using either of the plate **10***a* and the jig plate **10***j*. Alternatively, either a value stored when calculated by the adjustment amount calculation unit **231** or a value input by the operator when calculating the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot can be used as the cocking adjustment amount hp of the lenticular lens sheet **1** of the first lot.

After the printing operation of the lenticular lens sheets **1** of the first lot has ended, the operator operates the handle **337** based on the difference displayed on the monitor **211** while confirming the dial **337***a* of the manual transfer cylinder cocking adjustment device **213** from the state in which the transfer cylinder **114** has undergone the skewing adjustment (cocking adjustment) based on the cocking adjustment amount hp of the first lot. Transfer cylinder cocking adjustment step S**6** of the transfer cylinder **114** for the lenticular lens sheet **1** of the second lot is performed in this way.

As described above, when switching the lenticular lens sheets **1** from the first lot to the second lot, the operator performs skewing adjustment of the lenticular lens sheet **1** by the difference from the cocking adjustment amount hp of the first lot from the state in which the adjustment is done for the lenticular lens sheets **1** of the first lot. It is therefore possible to not only minimize the machine step time at the time of lot switching but also switch the lot without stopping the machine depending on the operation speed of the printing press or the relative change amount of the groove lines **2** between the lots.

Use of the jig plate **10***j* makes it possible to obtain the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot during printing of the lenticular lens sheet **1** of the first lot.

<First Modification of First Embodiment>

In the above-described first embodiment, the operator visually measures the distance hs between the lenticular lens sheet **1** and the stopper **22** of the table **20**. This distance measurement may mechanically be performed. In this case, a control console **200***a* as shown in FIG. **22** is used. The control console **200***a* includes a sensing unit **203** that optically senses the positional relationship between the stopper **22** and the lenticular lens sheet **1**. A camera, a photoelectric sensor, or the like is used as the sensing unit **203**. The sensing unit **203** is connected to a control device **201***a*.

As shown in FIG. **23**, the control device **201***a* includes a distance calculation unit **232** in addition to the above-described adjustment amount calculation unit **231**. The distance calculation unit **232** calculates the distance hs between the stopper **22** and the lenticular lens sheet **1** based on the output of the sensing unit **203**. The sensing unit **203** and the distance calculation unit **232** constitute a distance detection unit **204** that detects the distance hs from the stopper **22** to the edge of the lenticular lens sheet **1**.

Note that the same reference numerals as in FIGS. **9** and **10** denote the corresponding portions in FIGS. **22** and **23**. A description of the corresponding portions will be omitted.

In this case as well, the plate positioning step S**1** and the lenticular lens sheet aligning step S**2** in the manual transfer cylinder cocking adjustment operation are performed. The sensing unit **203** senses the positional relationship between the stopper **22** and the lenticular lens sheet **1** in a state in which the lenticular lens sheet **1** is aligned with the pattern **13** of the plate **10***a*, as shown in FIG. **15**B. The sensing result is output to the control device **201***a*.

If the sensing unit **203** is a camera, the sensing unit **203** captures the image of the state in which the lower edge **1***b* of the lenticular lens sheet **1** overlaid on the pattern **13** of the plate **10***a* is separated from the stopper **22**, as shown in FIG. **16**, and the image is output to the control device **201***a* as the sensing result. The distance calculation unit **232** of the control device **201***a* analyzes the image from the sensing unit **203**, thereby calculating the distance (gap amount) hs between the stopper **22** and the lower edge **1***b* of the lenticular lens sheet **1**. The distance measurement step S**3** of the distance hs is performed in this way.

If the sensing unit **203** is a photoelectric sensor, the position of the lower edge **1***b* of the lenticular lens sheet **1** away from the stopper **22** is sensed based on a change in the reflected light amount of the light-emitting/receiving device, and the sensing result is output to the control device **201***a*. The distance calculation unit **232** of the control device **201***a* calculates the distance hs between the stopper **22** and the lower edge **1***b* of the lenticular lens sheet **1** based on the sensing result from the sensing unit **203** and the position of the stopper **22** registered in advance. The distance detection step S**3** of the distance hs is performed in this way.

<Second Modification of First Embodiment>

In the first embodiment, the operator manually performs transfer cylinder cocking adjustment using the manual transfer cylinder cocking adjustment device **213** of the control console **200**. The transfer cylinder cocking adjustment may be performed automatically. In this case, an automatic transfer cylinder cocking adjustment device (cocking adjustment unit) **214** shown in FIG. **24** is used in place of the manual transfer cylinder cocking adjustment device **213**. Note that the same reference numerals as in FIG. **6** denote the corresponding portions in FIG. **24**.

The automatic transfer cylinder cocking adjustment device **214** is formed by adding a motor **345** to the manual transfer cylinder cocking adjustment device **213** shown in FIG. **6**. The motor **345** is an actuator that is connected to the rod **342** and makes the eccentric bearing **336** pivot by a predetermined angle via the rod **342**. The automatic transfer cylinder cocking adjustment device **214** is provided with, for example, a switch configured to give an instruction to the motor **345** that makes the eccentric bearing **336** pivot. The switch is used as an operation unit configured to operate the automatic transfer cylinder cocking adjustment device **214**. The rest of the arrangement of the automatic transfer cylinder cocking adjustment device **214** is the same as that of the manual transfer cylinder cocking adjustment device **213**. The motor **345**, the rod **342**, and the eccentric bearing **336** constitute the automatic transfer cylinder cocking adjustment device **214**. The automatic transfer cylinder cocking adjustment device **214** also functions as a sheet skewing device (cocking adjustment unit) that adjusts the angle of the lenticular lens sheet **1** with respect to the plate **10***a*.

As shown in FIG. **25**, a control console **200***b* includes a control device **201***b*, the input unit **202**, the above-described sensing unit **203**, the monitor **211**, the plate cylinder register adjustment device **140**, and the automatic transfer cylinder cocking adjustment device **214**. The input unit **202**, the sensing unit **203**, the monitor **211**, the plate cylinder register adjustment device **140**, and the automatic transfer cylinder cocking adjustment device **214** are connected to the control device **201***b*.

As shown in FIG. **26**, the control device **201***b* includes a control unit **233** in addition to the above-described adjustment amount calculation unit **231** and distance calculation unit **232**. The control unit **233** controls the motor **345** of the automatic transfer cylinder cocking adjustment device **214** based on the cocking adjustment amount hp calculated by the adjustment amount calculation unit **231**, thereby controlling the sheet skewing device.

In the automatic transfer cylinder cocking adjustment operation as well, the plate positioning step S1 and the lenticular lens sheet aligning step S2 are performed, as in the above-described manual transfer cylinder cocking adjustment operation. Then, the sensing unit **203** and the distance calculation unit **232** perform the distance measurement step S3 of calculating the distance (gap amount) hs between the stopper **22** of the table **20** and the lower edge **1***b* of the lenticular lens sheet **1**.

The adjustment amount calculation unit **231** calculates the cocking adjustment amount hp from the known sizes Ls and Lp registered in advance and the distance hs output from the distance calculation unit **232**. The calculation step S4 of the cocking adjustment amount hp is performed in this way. The cocking adjustment amount hp is output to the control unit **233**. At this time, the cocking adjustment amount hp can also be displayed on the monitor **211** (display step S**5**).

The control unit **233** drives the motor **345** of the automatic transfer cylinder cocking adjustment device **214** in accordance with the cocking adjustment amount hp. This moves the rod **342** and makes the eccentric bearing **336** pivotally attached to the distal end of the rod **342** pivot by an angle corresponding to the cocking adjustment amount hp. As a result, the transfer cylinder **114** undergoes skewing adjustment (cocking adjustment) in accordance with the pivotal movement of the eccentric bearing **336**. The control step of the control device **201***b* for the automatic transfer cylinder cocking adjustment device **214** is performed in this way.

<Second Embodiment>

The second embodiment of the present invention will be described next. The overall arrangement of a four-color sheet-fed web offset printing press **100** according to the second embodiment is the same as in the first embodiment. Hence, a description will appropriately be omitted, and portions different from the first embodiment will mainly be explained.

The four-color sheet-fed web offset printing press **100** according to the second embodiment performs the cocking adjustment operation using, as a plate cylinder cocking adjustment device (cocking adjustment unit), a manual skewing adjustment mechanism (to be described later) in a plate cylinder register adjustment device **140**, which manually adjusts a skewing register, without using the manual transfer cylinder cocking adjustment device **213** of the transfer cylinder **114** in the first embodiment. That is, in the second embodiment, the plate cylinder register adjustment device **140** serves as the plate cylinder cocking adjustment device as well.

<Arrangement of Plate Cylinder>

The arrangement of a plate cylinder **110***a* according to the second embodiment is the same as that of the plate cylinder **110***a* shown in FIGS. **2** and **3**. However, the plate cylinder register adjustment device **140** provided in the plate cylinder **110***a* is provided not only with the above-described circumferential position adjustment mechanism and lateral position adjustment mechanism but also with a manual skewing adjustment mechanism (plate cylinder cocking adjustment device) that adjusts the skewing register of the plate cylinder **110***a*. The manual skewing adjustment mechanism will be described.

The same reference numerals as in FIGS. **3** and **5** denote the corresponding portions in FIG. **27**. As shown in FIG. **27**, a bearing **181** having a U shape when viewed from a side is fixed at the top of a bracket **168** on the operation side. A rotating shaft **184** is axially supported by the bearing **181**. A handle **187** serving as an operation unit configured to rotate the rotating shaft **184** is attached to the distal end of the rotating shaft **184**. A rack **185** whose pivotal movement is regulated by a guide shaft **185***a* threadably engages with the threaded portion of the rotating shaft **184**.

A segment gear **186** having a fan shape meshes with the rack **185**. The segment gear **186** is fixed to the outer circumference of an inner metal **167**. An end shaft **110**Lb of the plate cylinder **110***a* is axially supported by the hole of a bearing portion **167***b* of the inner metal **167** to be rotatable. Note that the handle **187**, the rotating shaft **184**, the bearing **181**, the rack **185**, the segment gear **186**, and the inner metal **167** constitute the manual skewing adjustment mechanism (plate cylinder cocking adjustment device) that manually adjusts the skewing register of the plate cylinder **110***a*.

<Arrangement of Transfer Cylinder>

A transfer cylinder **114** according to the second embodiment is the same as the transfer cylinder **114** according to the first embodiment except that the manual transfer cylinder cocking adjustment device **213** (FIGS. **6** and **7**) is not provided as a sheet skewing device using the transfer cylinder **114**.

<Arrangement of Control Console>

The same reference numerals as in FIG. **9** denote the corresponding portions in FIG. **28**. As shown in FIG. **28**, a table **20** of a control console **200** incorporates a control device **201** having a microcomputer configuration. As in the first embodiment, an input unit **202** formed from a keyboard and the like, a monitor **211** serving as a display unit, and the plate cylinder register adjustment device **140** are connected to the control device **201**.

As described above, the plate cylinder register adjustment device **140** is used as the circumferential position adjustment mechanism, the lateral position adjustment mechanism, and manual skewing adjustment mechanism (plate cylinder cocking adjustment device). However, the control device **201** only controls to cause the plate cylinder register adjustment device **140** to function as the circumferential position adjustment mechanism and the lateral position adjustment mechanism. The control device **201** does not directly control to cause the plate cylinder register adjustment device **140** to function as the manual skewing adjustment mechanism. The function as the manual skewing adjustment mechanism is implemented by causing an operator who recognizes a cocking adjustment amount hp displayed on the monitor **211** to manually operate the plate cylinder register adjustment device **140**.

As shown in FIG. **29**, a control console **200***a* including a sensing unit **203** formed from a camera, a photoelectric sensor, or the like may be used, as in the first modification of the first embodiment.

<Arrangements of Lenticular Lens Sheet and Plate Mounted on Plate Cylinder>

Plates **10***a* to **10***d* mounted on plate cylinders **110***a* to **110***d* and a lenticular lens sheet **1** to which a pattern **13** of each of the plates **10***a* to **10***d* is transferred are the same as in the first embodiment.

<Plate Cylinder Register Adjustment Operation>

The circumferential and lateral register adjustment operations for the plate cylinders **110***a* to **110***d* by the plate cylinder register adjustment device **140** when circumferential and lateral misregistrations are generated between the lenticular lens sheet **1** and the pattern **13** of the plate **10***a* mounted on the plate cylinder **110***a* are the same as in the first embodiment.

Hence, a description of the circumferential and lateral register adjustment operations will be omitted.

<Manual Plate Cylinder Cocking Adjustment Operation>

A manual plate cylinder cocking adjustment operation when manually adjusting the skewing register of the plate cylinders **110***a* to **110***d* using the plate cylinder cocking adjustment device (handle **187**, rotating shaft **184**, bearing **181**, rack **185**, segment gear **186**, and inner metal **167**) after the plate cylinder register adjustment device **140** has performed the circumferential and lateral register adjustment operations for the plate cylinders **110***a* to **110***d* will be described.

The control device **201** calculates the cocking adjustment amount hp based on a distance (gap amount) hs between a stopper **22** and a lower edge **1***b* of the lenticular lens sheet **1** input from the input unit **202** by the operator, as in the first embodiment (calculation step S**4**). The control device **201** displays the cocking adjustment amount hp on the monitor **211** (display step S**5**).

The operator confirms the cocking adjustment amount hp on the monitor **211**, and operates the handle **187** of the manual skewing adjustment mechanism (plate cylinder cocking adjustment device) of the plate cylinder register adjustment device **140** (FIGS. **3** and **27**) in accordance with the cocking adjustment amount hp. The rotating shaft **184** rotates in accordance with the operation of the handle **187**, and the rack **185** is moved by the screw function obtained by the rotation of the rotating shaft **184**. This makes the segment gear **186** pivot, and the inner metal **167** integrated with the segment gear **186** accordingly pivots.

The axis of the outer circumference of the inner metal **167** and that of the plate cylinder **110***a* have an eccentric amount t**3** . The axial-direction orientation of the plate cylinder **110***a* undergoes skewing adjustment (plate cylinder cocking adjustment) by the cocking adjustment amount hp due to the eccentric function of the eccentric amount t3, and the plate cylinder **110***a* itself tilts by the cocking adjustment amount hp. As a result, the plate **10***a* mounted on the plate cylinder **110***a* also tilts by the cocking adjustment amount hp as a whole, as shown in FIG. **30**.

Similarly, the manual skewing adjustment mechanism (plate cylinder cocking adjustment device) of the plate cylinder register adjustment device **140** tilt the plate cylinders **110***b* to **110***d* themselves by the cocking adjustment amount hp.

As described above, the circumferential position adjustment mechanism, the lateral position adjustment mechanism, and the manual skewing adjustment mechanism (plate cylinder cocking adjustment device) of the plate cylinder register adjustment device **140** perform the circumferential and lateral register adjustment operations and the skewing adjustment operation in advance for the plate cylinders **110***a* to **110***d*. Adjustment is thus performed in advance such that when the lenticular lens sheet **1** passes between impression cylinders **112***a* to **112***d* and blanket cylinders **111***a* to **111***d* in contact with the plate cylinders **110***a* to **110***d*, a positional relationship in which a plurality of boundary lines **14** of the patterns **13** of the plates **10***a* to **10***d* to be transferred via the blanket cylinders **111***a* to **111***d* relatively match a plurality of groove lines **2** of the lenticular lens sheet **1** is obtained.

It is therefore possible to accurately transfer the combined pattern portions (A**1**+B**1**, A**2**+B**2**, . . .) of the patterns **13** of the plates **10***a* to **10***d* mounted on the plate cylinders **110***a* to **110***d* tilted by the cocking adjustment amount hp to the pattern transfer regions between the groove lines **2** of the lenticular lens sheet **1** conveyed by the transfer cylinder **114**.

Since the plate cylinder register adjustment device **140** has performed the circumferential, lateral, and skewing register adjustments, the four-color sheet-fed web offset printing press **100** performs test printing on the lenticular lens sheet **1** via printing units **102***a* to **102***d*. As a result, if shift amounts exist in register marks **15** and **16** of the respective colors printed on the lenticular lens sheet **1** by the printing units **102***a* to **102***d*, fine circumferential, lateral, or skewing register adjustment of the plate cylinders **110***a* to **110***d* is performed based on the shift amounts.

<Printing Operation of Four-Color Sheet-Fed Web Offset Printing Press>

In the four-color sheet-fed web offset printing press **100**, the lenticular lens sheet **1** held by a suction device **101***b* of a sheet supply device **101** is placed on a feeder board FB and conveyed. In a state in which one end (leading-side end) of the lenticular lens sheet **1** abuts against a front lay **101***c* provided on the distal end side of the feeder board FB, and the circumferential position is aligned, the lenticular lens sheet **1** is transferred from the swing arm grippers of the swing device to the gripper device of the transfer cylinder **114**.

The lenticular lens sheet **1** held by the gripper device of the transfer cylinder **114** is transferred to the gripper device of the impression cylinder **112***a*. In the second embodiment, since the transfer cylinder **114** has not undergone transfer cylinder cocking adjustment, the lenticular lens sheet **1** is held and conveyed by the gripper device of the impression cylinder **112***a* without skewing adjustment of its conveyance angle. At this time, the lenticular lens sheet **1** is conveyed with its reverse surface facing outward.

The lenticular lens sheet **1** held by the gripper device of the impression cylinder **112***a* is conveyed as the impression cylinder **112***a* rotates, and passes between the impression cylinder **112***a* and the blanket cylinder **111***a*. At this time, the pattern **13** of the plate **10***a* of the first color mounted on the plate cylinder **110***a* is transferred to the reverse surface of the lenticular lens sheet **1** via the blanket cylinder **111***a*.

The circumferential position adjustment mechanism, the lateral position adjustment mechanism, and the skewing adjustment mechanism (plate cylinder cocking adjustment device) of the plate cylinder register adjustment device **140** perform the circumferential and lateral register adjustment operations and the cocking adjustment operation according to the cocking adjustment amount hp for the plate cylinder **110***a* in advance. Hence, the pattern is accurately transferred in a state in which the boundary lines **14** of the pattern **13** of the plate **10***a* of the first color match the groove lines **2** of the lenticular lens sheet **1**.

The lenticular lens sheet **1** with the transferred pattern **13** of the plate **10***a* is transferred from the gripper device of the impression cylinder **112***a* to the gripper device of a transfer cylinder **115** and then conveyed from the transfer cylinder **115** to the impression cylinder **112***b* of the printing unit **102***b*.

The circumferential position adjustment mechanism, the lateral position adjustment mechanism, and the skewing adjustment mechanism (plate cylinder cocking adjustment device) of the plate cylinder register adjustment device **140** also perform the circumferential and lateral register adjustment operations and the cocking adjustment operation of the plate cylinders **110***b* to **110***d*. Hence, in the printing units **102***b*, **102***c*, and **102***d* as well, the patterns **13** of the plates **10***b*, **10***c*, and **10***d* of the second, third, and fourth colors are accurately transferred to the reverse surface of the lenticular lens sheet **1** via the blanket cylinders **111***b*, **111***c*, and **111***d*.

The lenticular lens sheet **1** to which the patterns **13** of the four colors have been transferred is conveyed to a sheet delivery device **103** via a transfer cylinder **118** and stacked on a stack board **103***a* for delivery via the gripper bar of a delivery chain.

Note that the calculation of the cocking adjustment amount hp, print processing, and the like for the lenticular lens sheet **1** of the second lot are the same as in the first embodiment, and a description thereof will be omitted here.

<Modification of Second Embodiment>

In the second embodiment, the operator manually performs the plate cylinder cocking adjustment operation. The plate cylinder cocking adjustment operation may be performed automatically. In this case, the plate cylinder register adjustment device **140** including a skewing adjustment motor **183** serving as an actuator for plate cylinder register adjustment as shown in FIGS. **3** and **5** is used.

The bearing **181** formed into a U shape is fixed at the top of the bracket **168** on the operation side. The rotating shaft **184** is axially supported by the bearing **181** and a bearing **182** on the frame side. The above-described skewing adjustment motor **183** is connected to the rotating shaft **184**. The rack **185** whose pivotal movement is regulated by the guide shaft **185***a* threadably engages with the threaded portion of the rotating shaft **184**. The rest of the arrangement is the same as in the second embodiment. Note that the skewing adjustment motor **183**, the rotating shaft **184**, the bearing **181**, the rack **185**, the segment gear **186**, and the inner metal **167** constitute the automatic skewing adjustment mechanism (plate cylinder cocking adjustment device, cocking adjustment unit) that automatically adjusts the skewing register of the plate cylinder **110***a*.

As shown in FIG. **31**, the basic arrangement of a control console **200***b* is the same as that of the control console **200***a* shown in FIG. **29**. However, a control device **201***b* of the control console **200***b* directly controls not only the circumferential position adjustment mechanism and the lateral position adjustment mechanism of the plate cylinder register adjustment device **140** but also the automatic skewing adjustment mechanism. For this purpose, the control device **201***b* includes a control unit **233** in addition to an adjustment amount calculation unit **231** and a distance calculation unit **232**, like the control device **201***b* shown in FIG. **26**. The control unit **233** controls the skewing adjustment motor **183** based on the cocking adjustment amount hp calculated by the adjustment amount calculation unit **231**, thereby controlling the automatic skewing adjustment mechanism.

An automatic plate cylinder cocking adjustment operation when automatically adjusting the skewing register of the plate cylinder **110***a* using the automatic skewing adjustment mechanism of the plate cylinder register adjustment device **140** will be described.

In the automatic plate cylinder cocking adjustment operation as well, plate positioning step S1 and lenticular lens sheet aligning step S2 are performed, as in the above-described manual plate cylinder cocking adjustment operation. Then, the sensing unit **203** and the distance calculation unit **232** perform distance measurement step S3 of calculating a distance (gap amount) hs between the stopper **22** of the table **20** and the lower edge **1***b* of the lenticular lens sheet **1**. The adjustment amount calculation unit **231** calculates the cocking adjustment amount hp from known sizes Ls and Lp registered in advance and the distance hs output from the distance calculation unit **232** (calculation step S4). The monitor **211** displays the cocking adjustment amount hp (display step S5).

The control unit **233** drives the skewing adjustment motor **183** of the automatic skewing adjustment mechanism of the plate cylinder register adjustment device **140** in accordance with the cocking adjustment amount hp. The rotating shaft **184** thus rotates, and the rack **185** is moved by the screw function obtained by the rotation of the rotating shaft **184**. This makes the segment gear **186** pivot, and the inner metal **167** integrated with the segment gear **186** accordingly pivots. The axial-direction orientation of the plate cylinder **110***a* undergoes skewing adjustment (plate cylinder cocking adjustment) by the cocking adjustment amount hp due to the eccentric function of the eccentric amount t**3**, and the plate cylinder **110***a* itself tilts by the cocking adjustment amount hp. As a result, the plate **10***a* mounted on the plate cylinder **110***a* also tilts by the cocking adjustment amount hp as a whole, as shown in FIG. **30**.

When the lenticular lens sheet **1** passes between impression cylinder **112***a* and the blanket cylinder **111***a* in contact with the plate cylinder **110***a*, a positional relationship in which the plurality of boundary lines **14** of the patterns **13** of the plate **10***a* to be transferred via the blanket cylinder **111***a* relatively match the plurality of groove lines **2** of the lenticular lens sheet **1** is obtained. Hence, in the printing unit **102***a*, it is possible to accurately transfer the combined pattern portions (A**1**+B**1**, A**2**+B**2**, . . .) of the pattern **13** of the plate **10***a* mounted on the plate cylinder **110***a* tilted by the cocking adjustment amount hp to the pattern transfer regions between the groove lines **2** of the lenticular lens sheet **1** conveyed by the transfer cylinder **114**.

<Third Embodiment>

The third embodiment of the present invention will be described next. The overall arrangement of a four-color sheet-fed web offset printing press **100** according to the third embodiment is the same as in the first embodiment. Hence, a description will appropriately be omitted, and portions different from the first embodiment will mainly be explained.

The four-color sheet-fed web offset printing press **100** according to the third embodiment uses a sheet skewing device (cocking adjustment unit) that directly tilts a lenticular lens sheet **1** by the front lay of a feeder board FB in place of the manual transfer cylinder cocking adjustment device **213** according to the first embodiment or the manual skewing adjustment mechanism (plate cylinder cocking adjustment device) of the plate cylinder register adjustment device **140** according to the second embodiment.

<Arrangement of Front Lay>

As shown in FIGS. **32** and **33**, the lenticular lens sheet **1** is conveyed on a feedboard **401** of the feeder board FB in the sheet conveyance direction indicated by an arrow A. A front lay **101***a* is disposed at the distal end of the feedboard **401**. The front lay **101***a* has a width slightly larger than that of the feedboard **401** of the feeder board FB. While projecting from the top of the distal end of the feedboard **401**, the front lay **101***a* is arranged parallel to the width direction of the feedboard **401** perpendicular to the sheet conveyance direction. The front lay **101***a* is provided with a front lay cocking adjustment device (cocking adjustment unit) **215** serving as a sheet skewing device that adjusts the angle with respect to the width direction of the feedboard **401**, thereby adjusting the orientation of the lenticular lens sheet **1** abutting against the front lay **101***a*.

In the front lay cocking adjustment device **215**, a holder **403** is axially supported by a shaft **402** provided under the feedboard **401**. A plate **405** is fixed to the holder **403** by a bolt **406**. The front lay **101***a* is attached to the end of the plate **405** by a set screw **407** to be adjustable in the vertical direction. The front lay **101***a* can movably be adjusted by an adjusting screw **404** in the sheet conveyance direction or a direction reverse to it.

As shown in FIG. **34**, an eccentric bearing **412** to which an eccentric amount t**5** is given by an axis F of the outer circumference and an axis F**1** of the internal circumference is axially supported by each of a drive-side frame **141** and an operation-side frame **165** so as to pivot. Axial direction movement of the eccentric bearing **412** is regulated by a bearing cap **414** fixed to each of the drive-side frame **141** and the operation-side frame **165** by a bolt **413**. A rod **415** having the other end connected to an operation unit (not shown) is pivotally attached, by a pin **416**, to a U-shaped portion formed at the inner-side end of the eccentric bearing **412**.

A spherical bearing **417** fits in each eccentric bearing **412**. A bearing cap **418** prevents the spherical bearing **417** from being externally detached. The spherical bearing **417** is formed from an outer ring **417***a* having a spherical inner surface and a sphere **417***b* that fits on the spherical inner surface of the outer ring **417***a*. The small-diameter portions at the ends of the shaft **402** are axially supported by the inner surfaces of the spheres **417***b* so as to pivot via a plurality of needles **420**.

A thrust bearing **421** fits on the small-diameter portion at one end of the shaft **402** between the spherical bearing **417** and one side wall of the large-diameter portion at the center of the shaft **402**. A thrust bearing **422** fits on the small-diameter portion at the other end of the shaft **402** so as to be adjacent to the spherical bearing **417**. In addition, a compression coil spring **423** that biases the shaft **402** against the thrust bearing **421** is held on the small-diameter portion at the other end of the shaft **402** between the thrust bearing **422** and the other side wall of the large-diameter portion at the center of the shaft **402**.

The front lay **101***a* is axially supported, via the holder **403** (not illustrated in FIG. **34**), by the large-diameter portion at the center of the shaft **402** located between the drive-side frame **141** and the operation-side frame **165**. A lever **424** is axially supported at one end of the shaft **402**. A thrust bearing **425** intervenes between the lever **424** and the spherical bearing **417**. A cam follower **426** pivotally attached to the lever **424** via a pin **424***a* is in contact with a cam **427** that is supported by the operation-side frame **165** and rotates in synchronism with the printing press. When the cam **427** rotates, the shaft **402** reciprocally pivots via the cam follower **426**, thereby swinging the front lay **101***a*.

As shown in FIG. **32**, the front lay **101***a* is swingably supported by the shaft **402** so as to move from the position indicated by the solid line to the retraction position indicated by the alternate long and short dashed line in accordance with the counterclockwise rotation of the shaft **402** and move from the position indicated by the alternate long and short dashed line to the register adjustment position indicated by the solid line in accordance with the clockwise rotation of the shaft **402**.

<Arrangement of Control Console>

The same reference numerals as in FIG. **9** denote the corresponding portions in FIG. **35**. As shown in FIG. **35**, a table **20** of a control console **200** incorporates a control device **201** having a microcomputer configuration. As in the first embodiment, an input unit **202** formed from a keyboard and the like, a monitor **211** serving as a display unit, and a plate cylinder register adjustment device **140** that performs circumferential and lateral register adjustments are connected to the control device **201**. However, the front lay cocking adjustment device **215** is not connected to the control device **201**.

As shown in FIG. **36**, a control console **200***a* including a sensing unit **203** formed from a camera, a photoelectric sensor, or the like may be used, as in the first modification of the first embodiment.

<Plate Cylinder Register Adjustment Operation>

The circumferential and lateral register adjustment operations for plate cylinders **110***a* to **110***d* by the plate cylinder register adjustment device **140** when circumferential and lateral misregistrations are generated between the lenticular lens sheet **1** and a pattern **13** of a plate **10***a* mounted on the plate cylinder **110***a* are the same as in the first embodiment. Hence, a description of the circumferential and lateral register adjustment operations will be omitted.

<Manual Front Lay Cocking Adjustment Operation>

A manual front lay cocking adjustment operation when manually performing front lay cocking adjustment using the front lay cocking adjustment device **215** will be described.

As shown in FIG. **35**, the control device **201** of the control console **200** calculates a cocking adjustment amount hp based on a distance (gap amount) hs between a stopper **22** and a lower edge **1***b* of the lenticular lens sheet **1** input from the input unit **202** by the operator, as in the first embodiment (calculation step S**4**). The control device **201** displays the cocking adjustment amount hp on the monitor **211** (display step S**5**).

Alternatively, as shown in FIG. **36**, the control device **201** of the control console **200***a* obtains the distance hs based on the detection result from the sensing unit **203**, as in the first embodiment (measurement step S**3**). The control device **201** calculates the cocking adjustment amount hp based on the distance hs (calculation step S**4**) and displays the cocking adjustment amount hp on the monitor **211** (display step S**5**).

The operator recognizes the cocking adjustment amount hp displayed on the monitor **211**, and operates the operation unit (not shown) of the front lay cocking adjustment device **215** in accordance with the cocking adjustment amount hp to move one rod **415** in a predetermined direction (a direction perpendicular to the drawing surface of FIG. **34**) by a predetermined amount. The eccentric bearing **412** thus pivots, and the shaft **402** is tilted by the eccentric function. Note that instead of moving only one rod **415**, both rods **415** may be moved in directions opposite to each other.

Hence, one end of the shaft **402** perpendicular to the drive-side frame **141** moves in the sheet conveyance direction or the direction reverse to it more than the other end, and the shaft **402** tilts with respect to the axial direction. Along with the tilt of the shaft **402**, the front lay **101***a* fixed to the holder **403** axially supported by the large-diameter portion at the center of the shaft **402** tilts by the cocking adjustment amount hp. That is, the front lay **101***a* tilts from the position indicated by the solid line to the position indicated by the alternate long and short dashed line, as shown in FIG. **33**. Alternatively, the front lay **101***a* tilts in a direction opposite to that indicated by the alternate long and short dashed line.

One end (leading-side end) of the lenticular lens sheet **1** conveyed on the feedboard **401** of the feeder board FB abuts against the front lay **101***a* tilted by the cocking adjustment amount hp. Hence, the lenticular lens sheet **1** also tilts in accordance with the tilt state of the front lay **101***a*.

As described above, the circumferential position adjustment mechanism, the lateral position adjustment mechanism, and the front lay cocking adjustment device **215** of the plate cylinder register adjustment device **140** perform the circumferential and lateral register adjustment operations of the plate cylinder **110***a* and the tilt adjustment operation of the front lay **101***a* in advance. Setting is thus done such that when the lenticular lens sheet **1** passes between an impression cylinder **112***a* and a blanket cylinder **111***a* in contact with the plate cylinder **110***a* via the front lay **101***a* and a transfer cylinder **114**, a positional relationship in which a plurality of boundary lines **14** of the pattern **13** of the plate **10***a* to be transferred via the blanket cylinder **111***a* relatively match a plurality of groove lines **2** of the lenticular lens sheet **1** is obtained.

A printing unit **102***a* thus sets a state in which it is possible to accurately transfer the combined pattern portions (A**1**+B**1**, A**2**+B**2**, . . .) of the pattern **13** of the plate **10***a* mounted on the plate cylinder **110***a* to the pattern transfer regions between the groove lines **2** of the lenticular lens sheet **1** conveyed via the front lay **101***a* of the feeder board FB and the transfer cylinder **114**.

<Printing Operation of Four-Color Sheet-Fed Web Offset Printing Press>

In the four-color sheet-fed web offset printing press **100**, the lenticular lens sheet **1** held by the suction device of a sheet supply device **101** is placed on the feedboard **401** of the feeder board FB and conveyed. One end (leading-side end) of the lenticular lens sheet **1** abuts against the front lay **101***a* provided at the distal end of the feeder board FB.

The front lay **101***a* is tilted by the front lay cocking adjustment device **215** in advance by the cocking adjustment amount hp. The circumferential orientation of the lenticular lens sheet **1** tilts in accordance with the tilt angle of the front lay **101***a*, and in this state, the leading-side end of the lenticular lens sheet **1** is gripped by the swing arm grippers of the swing device of the subsequent stage.

At this time, the control device **201** rotates the shaft **402** counterclockwise in FIG. **32** via the actuator. As the shaft **402** rotates, the front lay **101***a* moves from the register adjustment position indicated by the solid line to the retraction position indicated by the alternate long and short dashed line, and the lenticular lens sheet **1** is transferred from the feedboard **401** of the feeder board FB to the gripper device of the transfer cylinder **114** via the swing device.

The shaft **402** rotates clockwise during conveyance of the lenticular lens sheet **1** to the transfer cylinder **114** by the swing arm grippers of the swing device. The front lay **101***a* thus returns to the original register adjustment position and waits for the next lenticular lens sheet **1** to tilt its orientation.

The lenticular lens sheet **1** held by the gripper device of the transfer cylinder **114** is transferred to the gripper device of the impression cylinder **112***a* and conveyed as the impression cylinder **112***a* rotates, and passes between the impression cylinder **112***a* and the blanket cylinder **111***a*. At this time, the pattern **13** of the plate **10***a* of the first color mounted on the plate cylinder **110***a* that has undergone circumferential and lateral register adjustments in advance is transferred to the reverse surface of the lenticular lens sheet **1** via the blanket cylinder **111***a*.

As described above, the lenticular lens sheet **1** (FIG. **18**B) with the tilted groove lines **2** is conveyed via the transfer cylinder **114** while being tilted by the front lay **101***a* of the feeder board FB by the cocking adjustment amount hp, and passes between the impression cylinder **112***a* and the blanket cylinder **111***a* in contact with the plate cylinder **110***a*. As a result, a positional relationship in which the plurality of boundary lines **14** (FIG. **18**A) of the pattern **13** of the plate **10** to be transferred via the blanket cylinder **111***a* relatively match the plurality of groove lines **2** (FIG. **18**B) of the lenticular lens sheet **1** is obtained (FIG. **18**C).

The circumferential and lateral register adjustment operations of the plate cylinder **110***a* by the circumferential position adjustment mechanism and the lateral position adjustment mechanism of the plate cylinder register adjustment device **140** and the cocking adjustment operation by the cocking adjustment amount hp by the front lay **101***a* are performed in advance. Hence, the pattern is accurately transferred in a state in which the boundary lines **14** of the pattern **13** of the plate **10***a* of the first color match the groove lines **2** of the lenticular lens sheet **1**.

The combined pattern portions (A**1**+B**1**, A**2**+B**2**, . . .) of the pattern **13** of the plate **10***a* mounted on the plate cylinder **110***a* are accurately transferred, without shifts, to the pattern transfer regions between the groove lines **2** of the lenticular lens sheet **1** conveyed in a state in which the lenticular lens sheet **1** is tilted by the cocking adjustment amount hp.

The lenticular lens sheet **1** with the transferred pattern **13** of the plate **10***a* is transferred from the gripper device of the impression cylinder **112***a* to the gripper device of a transfer cylinder **115** and conveyed from the transfer cylinder **115** to a impression cylinder **112***b* of a printing unit **102***b*.

In the printing units **102***b*, **102***c*, and **102***d* as well, the patterns **13** of the plates **10***b*, **10***c*, and **10***d* of the second, third, and fourth colors are similarly accurately transferred to the reverse surface of the lenticular lens sheet **1** via blanket cylinders **111***b*, **111***c*, and **111***d*. After that, the lenticular lens sheet **1** is conveyed to a sheet delivery device **103** via a transfer cylinder **118** and stacked on a stack board **103***a* for delivery via the gripper bar of a delivery chain.

<Modification of Third Embodiment>

In the third embodiment, the operator manually performs the cocking adjustment operation of the front lay **101***a* using the front lay cocking adjustment device **215**. The cocking adjustment operation of the front lay **101***a* may automatically be performed.

In this case, a front lay cocking adjustment device (cocking adjustment unit) **216** shown in FIG. **37** is used. The front lay cocking adjustment device **216** is formed by providing a motor **216***a* in the front lay cocking adjustment device **215** shown in FIG. **34**. The motor **216***a* is connected to the rod **415** of the eccentric bearing **412**. The control device **201** directly controls the front lay cocking adjustment device **216**. The rest of the arrangement is the same as that in the third embodiment. Note that the same reference numerals as in FIG. **36** denote the corresponding portions in FIG. **37**,

An automatic front lay cocking adjustment operation of automatically adjusting the orientation of the front lay **101***a* using the front lay cocking adjustment device **216** will be described.

In this case as well, the above-described plate positioning step S**1** and lenticular lens sheet aligning step S**2** are performed. Then, the distance measurement step S**3** of causing the sensing unit **203** and the distance calculation unit **232** to calculate the distance (gap distance) hs between the stopper **22** of the table **20** and the lower edge **1***b* of the lenticular lens sheet **1** is performed. The adjustment amount calculation unit **231** calculates the cocking adjustment amount hp from the known sizes Ls and Lp registered in advance and the distance hs output from the distance calculation unit **232** (calculation step S**4**). The monitor **211** displays the cocking adjustment amount hp (display step S**5**).

The control unit **233** drives the motor **216***a* of the front lay cocking adjustment device **216** in accordance with the cocking adjustment amount hp. One rod **415** connected to the motor **216***a* moves in a predetermined direction by the cocking adjustment amount hp.

One end of the shaft **402** perpendicular to the drive-side frame **141** thus moves in the sheet conveyance direction or the direction reverse to it more than the other end, and the entire shaft **402** tilts with respect to the axial direction. Along with the tilt of the entire shaft **402**, the front lay **101***a* fixed to the holder **403** axially supported by the large-diameter portion at the center of the shaft **402** tilts by the cocking adjustment amount hp.

One end (leading-side end) of the lenticular lens sheet **1** conveyed on the feedboard **401** of the feeder board FB abuts against the front lay **101***a* tilted by the cocking adjustment amount hp. The lenticular lens sheet **1** thus tilts in accordance with the tilt state of the front lay **101***a*.

<Fourth Embodiment>

The fourth embodiment of the present invention will be described next with reference to FIGS. **38**, **39**, and **40**. The same reference numerals as in FIGS. **1** and **9** denote the corresponding portions in FIGS. **38** and **39**.

A four-color sheet-fed web offset printing press **100***a* according to the fourth embodiment is different from the four-color sheet-fed web offset printing press **100** according to the first embodiment in the method of calculating a cocking adjustment amount hp.

As shown in FIG. **38**, a control console **200***c* of the four-color sheet-fed web offset printing press **100***a* includes a camera **222** disposed above the upper surface of a table **20**. As shown in FIG. **39**, the camera **222** is connected to a control device **201***c* of the control console **200***c*. The control device **201***c* has a microcomputer configuration including a CPU, and includes an angle detection unit **234** and an adjustment amount calculation unit **231***c*, as shown in FIG. **40**. The functions of the angle detection unit **234** and the adjustment amount calculation unit **231***c* will be described later. The rest of the arrangement of the four-color sheet-fed web offset printing press **100***a* is the same as that of the four-color sheet-fed web offset printing press **100** according to the first embodiment, and a description thereof will be omitted.

<Plate Cylinder Register Adjustment Operation>

The adjustment operation of the four-color sheet-fed web offset printing press **100***a* will be described next.

The circumferential and lateral register adjustment operations for plate cylinders **110***a* to **110***d* by a plate cylinder register adjustment device **140** when circumferential and lateral misregistrations are generated between a lenticular lens sheet **1** and a pattern **13** of a plate **10***a* mounted on the plate cylinder **110***a* are the same as in the first embodiment. Hence, a description of the circumferential and lateral register adjustment operations will be omitted.

<Manual Plate Cylinder Cocking Adjustment Operation>

A manual plate cylinder cocking adjustment operation when manually adjusting the skewing register of a transfer cylinder **114** using a manual transfer cylinder cocking adjustment device **213** will be described.

First, the operator places the plate **10***a* of the first color to be mounted on the plate cylinder **110***a* on the upper surface of the table **20** of the control console **200***c*. At this time, a rectangular notch **11** and a U-shaped notch **12** formed in a lower edge **19** of the plate **10***a* are fitted on two stoppers **21** and **22** projecting from a frame **20***a* of the table **20** so as to abut against them, as shown in FIG. **14**. The plate **10***a* is thus positioned on the table **20**. Plate positioning step S**11** (FIG. **42**) of the plate **10***a* is performed in this way.

As shown in FIG. **41**A, the operator places the lenticular lens sheet **1** on the plate **10***a* positioned on the table **20** and abuts the lower edge **1***b* of the lenticular lens sheet **1** against the stoppers **21** and **22** of the table **20**. Positioning step S**12** (FIG. **42**) of positioning the plate **10***a* and the lenticular lens sheet **1** by the stoppers **21** and **22** is performed in this way.

In this state, the operator captures a predetermined area AR from above the lenticular lens sheet **1** using the camera **222**. Since the lenticular lens sheet **1** is formed from a transparent member, a captured image in which a plurality of boundary lines **14** of the pattern **13** of the plate **10***a* and a plurality of groove lines **2** of the lenticular lens sheet **1** cross, as shown in FIG. **41**B, is obtained. Image capturing step S**13** (FIG. **42**) is performed in this way. The image data of the captured image is output from the camera **222** to the control device **201***c*.

The angle detection unit **234** of the control device **201***c* performs image analysis of the image data, thereby calculating an angle α made by the boundary lines **14** of the pattern **13** of the plate **10***a* positioned to the reference position by the stoppers **21** and **22** and the groove lines **2** of the lenticular lens sheet **1** positioned by abutting the lower edge **1***b* against the stoppers **21** and **22**. Detection step S**14** (FIG. **42**) of detecting the angle α made by the boundary lines **14** and the groove lines **2** is performed in this way.

Next, the adjustment amount calculation unit **231***c* of the control device **201***c* calculates the cocking adjustment amount hp of the lenticular lens sheet **1** with respect to the pattern **13** of the plate **10***a* based on the angle α. The angle α equals the angle θ shown in FIGS. **17**A to **17**C. Hence, using a distance Lp between the shaft supporting portions of the transfer cylinder **114**, the cocking adjustment amount hp is obtained by $hp = Lp \times \sin \alpha$. Calculation step S**15** (FIG. **42**) of the cocking adjustment amount hp is performed in this way. Note that the cocking adjustment amount hp may directly be calculated from the relationship between the boundary lines **14** and the groove lines **2** without obtaining the angle α.

The control device **201***c* displays the calculated cocking adjustment amount hp on a monitor **211**. The operator can thus recognize the cocking adjustment amount hp serving as an index when manually performing cocking adjustment of the transfer cylinder **114**. Display step S**16** (FIG. **42**) of the cocking adjustment amount hp is performed in this way.

The operator operates a handle **337** based on the cocking adjustment amount hp displayed on the monitor **211** while confirming a dial **337***a* of the manual transfer cylinder cocking adjustment device **213**. In accordance with the operation of the handle **337**, a lever **339** swings via a piece **341**, and an eccentric bearing **336** pivots via a rod **342** by an angle corresponding to the pivotal operation of the handle **337**. The transfer cylinder **114** thus undergoes skewing adjustment (cocking adjustment) in accordance with the pivotal movement of the eccentric bearing **336**. Transfer cylinder cocking adjustment step S**17** (FIG. **42**) is performed in this way.

Since the bearing **336** on the operation side of the transfer cylinder **114** has an eccentric amount t**4**, the shaft of the transfer cylinder **114** tilts with respect to the shaft of the impression cylinder **112***a* by the eccentric function of the bearing **336**, and skewing adjustment (cocking adjustment) is performed by the cocking adjustment amount hp. The lenticular lens sheet **1** conveyed via the transfer cylinder **114** also tilts by the cocking adjustment amount hp, and the conveyance angle of the lenticular lens sheet **1** is adjusted.

That is, when the lenticular lens sheet **1** conveyed via a feeder board FB and the swing device is transferred to the gripper device of the transfer cylinder **114**, the lenticular lens sheet **1** is held and conveyed in a state in which the conveyance angle undergoes skewing adjustment by the cocking adjustment amount hp because the manual transfer cylinder cocking adjustment device **213** has performed the skewing adjustment of the transfer cylinder **114** in advance by the cocking adjustment amount hp.

As described above, the circumferential position adjustment mechanism and the lateral position adjustment mechanism of the plate cylinder register adjustment device **140** perform the circumferential and lateral register adjustment operations of the plate cylinders **110***a* to **110***d* in advance. In addition, the manual transfer cylinder cocking adjustment device **213** performs the cocking adjustment operation of the transfer cylinder **114** in advance. Adjustment is thus performed in advance to a transfer enable state in which the plurality of boundary lines **14** of the pattern **13** of each of the plates **10***a* to **10***d* on the plate cylinders **110***a* to **110***d* of the first to fourth colors match the plurality of groove lines **2** of the lenticular lens sheet **1**.

When passing through the transfer cylinder **114** that has undergone the skewing adjustment in advance, the lenticular lens sheet **1** having the tilted groove lines **2** also undergoes skewing adjustment by itself. The lenticular lens sheet **1** that has undergone the skewing adjustment passes between the impression cylinder **112***a* and the blanket cylinder **111***a* in contact with the plate cylinder **110***a* that has undergone the circumferential and lateral register adjustments in advance. At this time, a positional relationship in which the boundary lines **14** of the pattern **13** of the plate **10***a* transferred via the blanket cylinder **111***a* relatively match the groove lines **2** of the lenticular lens sheet **1** is obtained. It is therefore possible to accurately transfer the combined pattern portions (**A1**+**B1**, **A2**+**B2**, . . .) of the pattern **13** of the plate **10***a* to the pattern transfer regions between the groove lines **2** of the lenticular lens sheet **1** without shifts. The adjustment operation of the four-color sheet-fed web offset printing press **100***a* thus ends.

Test printing and fine adjustment operations after that are the same as in the first embodiment. Additionally, as in the first embodiment, the circumferential and lateral register adjustment operations may be performed after the cocking adjustment operation of the transfer cylinder **114**.

<Printing Operation of Four-Color Sheet-Fed Web Offset Printing Press>

The printing operation of the four-color sheet-fed web offset printing press **100***a* for the lenticular lens sheet **1** of the first lot is the same as in the first embodiment. Hence, printing for the lenticular lens sheet **1** of the second lot will be described.

A method of calculating the cocking adjustment amount hp for the lenticular lens sheet **1** of the second lot will be explained. In a state in which the lenticular lens sheet **1** of the second lot is overlaid on the lenticular lens sheet **1** of the first lot, the operator abuts the lower edges **1***b* of the two lenticular lens sheets **1** against the stoppers **21** and **22** of the table **20**. Without rotating the lenticular lens sheet **1** of the second lot, the operator captures the predetermined area AR from above the lenticular lens sheet **1** using the camera **222**. With this operation, a captured image in which the plurality of groove lines **2** of the lenticular lens sheet **1** of the first lot and the plurality of groove lines **2** of the lenticular lens sheet **1** of the second lot cross is obtained.

The angle detection unit **234** of the control device **201***c* performs image analysis of the image data of the captured image, thereby calculating the angle α made by the groove lines **2** of the lenticular lens sheet **1** of the first lot and the groove lines **2** of the lenticular lens sheet **1** of the second lot. The adjustment amount calculation unit **231***c* of the control device **201***c* calculates the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot with respect to the lenticular lens sheet **1** of the first lot based on the angle α. The thus obtained cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot is the difference from the cocking adjustment amount hp of the lenticular lens sheet **1** of the first lot.

The cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot is also calculated in advance before the start of the printing operation of the four-color sheet-fed web offset printing press **100***a*. After printing of the lenticular lens sheets **1** of the first lot, the operator operates the handle **337** based on the cocking adjustment amount hp of the second lot (the difference from the cocking adjustment amount hp of the first lot) obtained in advance while confirming the dial **337***a* of the manual transfer cylinder cocking adjustment device **213**. Since the transfer cylinder **114** undergoes skewing adjustment (cocking adjustment) in accordance with the lenticular lens sheet **1** of the second lot, the conveyance angle of the lenticular lens sheet **1** of the second lot conveyed via the transfer cylinder **114** also undergoes skewing adjustment.

If a jig plate **10***j* shown in FIG. **21** is present, the lenticular lens sheet **1** of the second lot is overlaid on the jig plate **10***j*, and this state is captured by the camera **222**. This allows the control device **201***c* to obtain the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot. That is, the angle detection unit **234** analyzes the image data of the captured image, and calculates the angle α made by the plurality of boundary lines **14** of the pattern **13** of the jig plate **10***j* and the plurality of groove lines **2** of the lenticular lens sheet **1** of the second lot. The adjustment amount calculation unit **231***c* calculates the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot based on the angle α. This corresponds to the above-described absolute cocking adjustment amount hp. Hence, the adjustment amount calculation unit **231***c* calculates the difference between the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot and the cocking adjustment amount hp of the lenticular lens sheet **1** of the first lot. The control device **201***c* displays the difference on the monitor **211** as the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot.

After the printing operation of the lenticular lens sheets **1** of the first lot has ended, the operator operates the handle **337** based on the difference displayed on the monitor **211** while confirming the dial **337***a* of the manual transfer cylinder cocking adjustment device **213** from the state in which the transfer cylinder **114** has undergone the skewing adjustment (cocking adjustment) based on the cocking adjustment amount hp of the first lot. Transfer cylinder cocking adjustment step **S17** of the transfer cylinder **114** for the lenticular lens sheet **1** of the second lot is performed in this way.

Use of the jig plate **10***j* makes it possible to obtain the cocking adjustment amount hp of the lenticular lens sheet **1** of the second lot during printing of the lenticular lens sheet **1** of the first lot.

<First Modification of Fourth Embodiment>

In the fourth embodiment, the operator manually performs transfer cylinder cocking adjustment using the manual transfer cylinder cocking adjustment device **213** of the control console **200***c*. The transfer cylinder cocking adjustment may be performed automatically. In this case, an automatic transfer cylinder cocking adjustment device (cocking adjustment unit) **214** having the same arrangement as that of the automatic transfer cylinder cocking adjustment device **214** shown in FIG. **24** is used in place of the manual transfer cylinder cocking adjustment device **213**, as in the second modification of the first embodiment. The automatic transfer cylinder cocking adjustment device **214** functions as a sheet skewing device (cocking adjustment unit) that adjusts the angle of the lenticular lens sheet **1** with respect to the plate **10***a*.

As shown in FIG. **43**, a control console **200***d* includes a control device **201***d*, an input unit **202**, the camera **222**, the monitor **211**, the plate cylinder register adjustment device **140**, and the automatic transfer cylinder cocking adjustment device **214**. The input unit **202**, the camera **222**, the monitor **211**, the plate cylinder register adjustment device **140**, and the automatic transfer cylinder cocking adjustment device **214** are connected to the control device **201***d*.

As shown in FIG. **44**, the control device **201***d* includes a control unit **233** in addition to the above-described angle detection unit **234** and adjustment amount calculation unit

231*c*. The control unit **233** controls the motor **345** of the automatic transfer cylinder cocking adjustment device **214** based on the cocking adjustment amount hp calculated by the adjustment amount calculation unit **231***c*, thereby controlling the sheet skewing device.

In the automatic transfer cylinder cocking adjustment operation as well, the plate positioning step S**11**, the positioning step S**12** of positioning the plate **10***a* and the lenticular lens sheet **1**, the image capturing step S**13**, the detection step S**14** of detecting the angle α, and the calculation step S**15** of the cocking adjustment amount hp are performed, as in the above-described manual transfer cylinder cocking adjustment operation. The cocking adjustment amount hp is output to the control unit **233**. At this time, the cocking adjustment amount hp can also be displayed on the monitor **211** (display step S**16**).

The control unit **233** drives the motor **345** of the automatic transfer cylinder cocking adjustment device **214** in accordance with the cocking adjustment amount hp. This moves the rod **342** and makes the eccentric bearing **336** pivotally attached to the distal end of the rod **342** pivot by an angle corresponding to the cocking adjustment amount hp. As a result, the transfer cylinder **114** undergoes skewing adjustment (cocking adjustment) in accordance with the pivotal movement of the eccentric bearing **336**. The control step of the control device **201***d* for the automatic transfer cylinder cocking adjustment device **214** is performed in this way.

<Second Modification of Fourth Embodiment>

In this embodiment, the angle α made by the boundary lines **14** of the pattern **13** of the plate **10***a* and the groove lines **2** of the lenticular lens sheet **1** is calculated by the camera **222** and the angle detection unit **234** of the control device **201***c* or **201***d*, and the cocking adjustment amount hp is calculated based on the angle α. This method of calculating the cocking adjustment amount hp is also applicable to the second embodiment and the modification thereof and the third embodiment and the modification thereof.

<Other Embodiments>

In the first to fourth embodiments, a case has been described in which the lenticular lens sheet **1** on which two types of pattern portions A**1**, B**1**, A**2**, B**2**, . . . are printed is used as the printing target. However, in the present invention, a lenticular lens sheet on which three types of pattern portions A**1**, B**1**, C**1**, A**2**, B**2**, C**2**, . . . are printed, or more types of pattern portions are printed may be used as the printing target.

In the first to fourth embodiments, a case has been described in which register adjustment (circumferential and lateral directions) of the plates **10***b* to **10***d* is performed using, as the reference, the register adjustment amount of the first plate **10***a* out of the printing units **102***a* to **102***d* of the four colors. However, in the present invention, the jig plate **10***j* shown in FIG. **21** may be used, and the register adjustment of the four plates **10***a* to **10***d* may be performed using the register adjustment amount of the jig plate **10***j* as the reference.

In the first to fourth embodiments, a case has been described in which the two stoppers **21** and **22** in the control console **200** are used. However, in the present invention, two or more reference members may be used.

In the first to fourth embodiments, a case has been described in which the plate **10***a* is positioned on the table **20** using the stoppers **21** and **22** serving as the reference members. However, in the present invention, two plate positioning members that position the plate **10***a* on the table **20** may be provided independently of the stoppers **21** and **22** serving as the reference members.

<Effects of Embodiments>

According to the above-described embodiments, the cocking adjustment amount hp for the cocking adjustment unit (**140**, **213** to **215**) is calculated based on the relationship between the boundary lines **14** of the plate **10** and the groove lines **2** of the lenticular lens sheet **1** in a state in which the lenticular lens sheet **1** is overlaid on the plate **10**. The relative angle between the plate **10** and the lenticular lens sheet **1** is adjusted based on the cocking adjustment amount hp. It is therefore possible to accurately align the plurality of pattern portions A**1**, B**1**, . . . of the plate **10** with the groove lines **2** between the lenses of the lenticular lens sheet **1** before printing, and reduce the number of rejected sheets and improve the productivity.

In an embodiment, the lenticular lens sheet **1** is overlaid on the plate **10** positioned on the table **20**. At this time, the lenticular lens sheet **1** is overlaid while bringing an edge of the lenticular lens sheet **1** into contact with one stopper **21** such that the groove lines **2** of the lenticular lens sheet **1** become parallel to the boundary lines **14** of the plate **10**. The cocking adjustment amount hp is calculated based on the distance hs from the other stopper **22** to the edge of the lenticular lens sheet **1** at this time. According to this method, the cocking adjustment amount hp can be calculated using simple members or the table **20** and the two stoppers **21** and **22**.

In this case, the plate **10** may be provided with the scale **17** configured to measure the distance hs from the other stopper **22** to the edge of the lenticular lens sheet **1**. This makes it possible to accurately measure the distance hs from the other stopper **22** to the edge of the lenticular lens sheet **1** when the boundary lines **14** of the pattern **13** formed on the plate **10** are parallel to the groove lines **2** of the lenticular lens sheet **1**.

In another embodiment, the angle α between the boundary lines **14** and the groove lines **2** is detected based on the image obtained by capturing the boundary lines **14** between the plurality of pattern portions A**1**, B**1**, . . . formed on the plate **10** and the groove lines **2** between the lenses of the lenticular lens sheet **1**. The cocking adjustment amount hp is calculated based on the angle α. According to this method, the operator can be saved from aligning the plate **10** and the lenticular lens sheet **1** such that the groove lines **2** become parallel to the boundary lines **14**, and the cocking adjustment amount hp can be calculated in a short time.

In this case, the plate **10** and the lenticular lens sheet **1** positioned by the two stoppers **21** and **22** may be captured in a state in which the lenticular lens sheet **1** is overlaid on the plate **10**. The angle α between the boundary lines **14** of between the pattern portions A**1**, B**1**, . . . of the plate **10** and the groove lines **2** of the lenticular lens sheet **1** can thus accurately be detected.

According to the above-described embodiments, the cocking adjustment unit (**140**, **213** to **215**) includes the operation unit **187** or **337** configured to operate the cocking adjustment unit (**140**, **213** to **215**). Hence, when the operator is caused to recognize, via the display unit **211**, the cocking adjustment amount hp calculated by the adjustment amount calculation unit **231** of the control device **201**, the operator can operate the operation unit **187** or **337** of the cocking adjustment unit (**140**, **213** to **215**) in accordance with the cocking adjustment amount hp and perform cocking adjustment. It is therefore possible to easily and accurately perform the cocking adjustment operation.

According to the above-described embodiments, the control unit **233** of the control device **201** controls the cocking adjustment unit (**140**, **213** to **215**) based on the cocking adjustment amount hp. The cocking adjustment operation is thus automatically executed without making the operator perform the cocking adjustment operation. Hence, the burden on the operator largely decreases, and accurate cocking adjustment is performed.

The cocking adjustment unit can be formed from the plate cylinder cocking device **140** that adjusts the axial-direction orientations of the plate cylinders **110***a* to **110***d* to which the plates **10** are attached or the sheet skewing devices **213** to **215** each of which adjusts the angle of the lenticular lens sheet **1** with respect to the plate **10**. The relative angle between the plate **10** and the lenticular lens sheet **1** can be adjusted by the plate cylinder cocking device **140** or the sheet skewing devices **213** to **215**.

What is claimed is:

1. A printing press of a lenticular lens sheet, comprising:

a cocking adjustment unit that adjusts a relative angle between a plate on which a pattern formed from a plurality of pattern portions is formed such that boundary lines between the adjacent pattern portions become parallel and the lenticular lens sheet on which a plurality of lenses are formed such that groove lines between the adjacent lenses become parallel and which is transparent;

a table on which the plate and the lenticular lens sheet are placed;

an adjustment amount calculation unit that calculates an adjustment amount for the cocking adjustment unit based on a relationship between the boundary lines of the pattern formed on the plate and the groove lines of the lenticular lens sheet that are in a state in which the lenticular lens sheet is overlaid on the plate placed on the table; and

a plate cylinder to which the plate is attached,

wherein the cocking adjustment unit comprises a plate cylinder cocking device that adjusts an axial-direction orientation of the plate cylinder based on the adjustment amount calculated by the adjustment amount calculation unit.

2. A printing press according to claim **1**, further comprising:

a first reference member and a second reference member that are arranged on the table while being spaced apart from each other.

3. A printing press according to claim **2**, wherein the adjustment amount calculation unit is configured to calculate the adjustment amount based on a distance from the second reference member to the edge of the lenticular lens sheet when the lenticular lens sheet is overlaid on the plate positioned on the table while being in contact with the first reference member such that the groove lines become parallel to the boundary lines.

4. A printing press according to claim **3**, wherein the plate includes a scale indicating the distance from the second reference member.

5. A printing press according to claim **3**, further comprising a distance detection unit that detects the distance from the second reference member to the edge of the lenticular lens sheet.

6. A printing press according to claim **1**, further comprising:

a camera that captures the boundary lines and the groove lines; and

an angle detection unit that detects an angle between the boundary lines and the groove lines based on an image captured by the camera,

wherein the adjustment amount calculation unit is configured to calculate the adjustment amount based on the angle detected by the angle detection unit.

7. A printing press according to claim **6**, further comprising:

two reference members provided on the table and serving as positioning references of the plate and the lenticular lens sheet,

wherein the camera captures the plate and the lenticular lens sheet positioned by the two reference members in the state in which the lenticular lens sheet is overlaid on the plate.

8. A printing press according to claim **1**, further comprising:

a display unit that displays the adjustment amount calculated by the adjustment amount calculation unit,

wherein the cocking adjustment unit includes an operation unit configured to operate the cocking adjustment unit.

9. A printing press according to claim **1**, further comprising a control unit configured to control the cocking adjustment unit based on the adjustment amount calculated by the adjustment amount calculation unit.

10. A printing method of a lenticular lens sheet, comprising the steps of:

positioning a plate on which a pattern including a plurality of pattern portions is formed such that boundary lines between the adjacent pattern portions become parallel and the lenticular lens sheet on which a plurality of lenses are formed such that groove lines between the adjacent lenses become parallel and which is transparent by placing the plate on a table and overlaying the lenticular lens sheet on the plate;

calculating, by an adjustment amount calculation unit based on a relationship between the boundary lines of the pattern formed on the plate and the groove lines of the lenticular lens sheet that are in a state in which the lenticular lens sheet is overlaid on the plate placed on the table, an adjustment amount for a cocking adjustment unit that adjusts a relative angle between the plate and the lenticular lens sheet; and

adjusting, by a plate cylinder cocking device that the cocking adjustment unit comprises, an axial-direction orientation of a plate cylinder to which the plate is attached based on the calculated adjustment amount.

11. A method according to claim **10**, wherein the step of positioning the plate and the lenticular lens sheet includes the steps of:

positioning the plate by a first reference member and a second reference member that are arranged on the table while being spaced apart from each other; and

overlaying the lenticular lens sheet on the positioned plate.

12. A method according to claim **11**, further comprising the steps of:

rotating the lenticular lens sheet such that an edge of the lenticular lens sheet overlaid on the plate is separated from the second reference member while being kept in contact with the first reference member to make the groove lines and the boundary lines parallel; and

measuring a distance from the second reference member to the edge of the lenticular lens sheet,

wherein the step of calculating the adjustment amount includes the step of calculating the adjustment amount based on the distance.

13. A method according to claim **12**, wherein the step of measuring the distance includes the step of causing a distance detection unit to measure the distance.

14. A method according to claim **10**, further comprising the steps of:

causing a camera to capture the boundary lines and the groove lines in the state in which the lenticular lens sheet is overlaid on the plate; and

detecting an angle between the boundary lines and the groove lines based on an image captured by the camera,

wherein the step of calculating the adjustment amount includes the step of calculating the adjustment amount based on the angle.

15. A method according to claim **10**, further comprising the step of displaying the calculated adjustment amount on a display unit.

16. A method according to claim **10**, the step of adjusting includes the step of causing a control unit to control the cocking adjustment unit based on the calculated adjustment amount.

17. A printing press of a lenticular lens sheet, comprising:

a cocking adjustment unit that adjusts a relative angle between a plate on which a pattern formed from a plurality of pattern portions is formed such that boundary lines between the adjacent pattern portions become parallel and the lenticular lens sheet on which a plurality of lenses are formed such that groove lines between the adjacent lenses become parallel and which is transparent;

a table on which the plate and the lenticular lens sheet are placed; and

an adjustment amount calculation unit that calculates an adjustment amount for the cocking adjustment unit based on a relationship between the boundary lines of the pattern formed on the plate and the groove lines of the lenticular lens sheet that are in a state in which the lenticular lens sheet is overlaid on the plate placed on the table,

wherein the cocking adjustment unit comprises a sheet skewing device that adjusts a conveyance angle of the lenticular lens sheet based on the adjustment amount calculated by the adjustment amount calculation unit.

18. A printing method of a lenticular lens sheet, comprising the steps of:

positioning a plate on which a pattern including a plurality of pattern portions is formed such that boundary lines between the adjacent pattern portions become parallel and the lenticular lens sheet on which a plurality of lenses are formed such that groove lines between the adjacent lenses become parallel and which is transparent by placing the plate on a table and overlaying the lenticular lens sheet on the plate;

calculating, by an adjustment amount calculation unit based on a relationship between the boundary lines of the pattern formed on the plate and the groove lines of the lenticular lens sheet that are in a state in which the lenticular lens sheet is overlaid on the plate placed on the table, an adjustment amount for a cocking adjustment unit that adjusts a relative angle between the plate and the lenticular lens sheet; and

adjusting, by a sheet skewing device that the cocking adjustment unit comprises, a conveyance angle of the lenticular lens sheet based on the calculated adjustment amount.

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